Description of document:	Federal Aviation Administration (FAA) report Time Based Flow Management (TBFM) Study Report, 2014
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U.S. Department
of Transportation
**Federal Aviation
Administration**

Mission Support Services
800 Independence Avenue, SW
Washington, DC 20591

APR - 4 2017

Re: Freedom of Information Act (FOIA) request 2017-004677

This letter responds to your Freedom of Information Act (FOIA) request, 2017-004677, dated February 20, 2017. Your request sought the digital/electronic copy of the FAA Report dated April 17, 2014, entitled Time Based Flow Management (TBFM) Study Report in regards to air traffic controllers.

A search was performed by Air Traffic Procedures, Mission Support Services, AJV-8 that located the TBFM Study dated April 17, 2014. The requested information is attached.

If you owe fees for the processing of this request, an invoice containing the amount due and payment instructions will be enclosed.

Sincerely,

Elizabeth L. Ray
Vice President, Mission Support Services
Air Traffic Organization

Attachment
Enclosure

U.S. Department
of Transportation
**Federal Aviation
Administration**

FOIA Program Management Branch
800 Independence Avenue SW
Washington, DC 20591

March 09, 2017

Re: Freedom of Information Act (FOIA) Request 2017-004677

This letter acknowledges receipt of your FOIA request dated February 20, 2017, concerning copy of the FAA Report dated April 17, 2014 entitled TBFM Study Report.

Your request has been assigned for action to the office(s) listed below:

Federal Aviation Administration Air Traffic Organization (AJI-172) 800 Independence Avenue SW Washington, DC 20591	Contact: Melanie Yohe FOIA Coordinator (202) 267-1698

Should you wish to inquire as to the status of your request, please contact the assigned FOIA coordinator(s). Please refer to the above referenced number on all future correspondence regarding this request.

Sincerely,

Alan Billings

Alan Billings

TBFM Study Report

1. Executive Summary

At the request of the ATO Executive Leadership, a TBFM Study Group was brought together to assess the current state of Time Based Flow Management (TBFM) in the NAS today. The results of the eight week assessment that follows provide a current status of TBFM in the NAS as well as looking towards TBFM applications in the future. The findings of this group are the culmination of site visits, briefings, interviews, review of various reports/documentation, and discussions with customer base through Airlines for America (A4A) and National Business Aviation Association (NBAA), along with other interactions which were intended to provide a holistic view of TBFM.

TBFM is deployed NAS wide. TBFM is installed in 87 facilities and reaches other locations through the application of Traffic Management Procedures. Although the technology resides in many locations, it has evolved at a varying pace and with varying levels of expertise resulting in a system which is intended to be integrated but is more fragmented in its use.

A NAS-wide vision for TBFM supporting present or future operations was not apparent across the span of the facilities visited or contacted. Each facility has determined its own use for TBFM independent of higher priorities. A NAS-wide definition of success for TBFM does not exist and there are no metrics to measure the operational contribution of the system. In the absence of a NAS-wide vision or metrics, local priorities and applications have emerged. The following issues have the most impact on the use and application of TBFM today.

- **Vision:** There is no clearly communicated single statement of common purpose for TBFM in the NAS today.

- **Operational Direction:** There is no single force bringing Service Units together in providing national focus and operational direction for TBFM in the NAS. This ultimately impacts what is and what is not accomplished in the field.

- **Policy and Procedures** were limited in content and practical application. No national requirements have been established for TBFM utilization. The majority of site visits did not reveal clear documentation of local policy for the utilization of, and responsibilities associated with TBFM.

- **Training** resonated throughout this review as an issue and concern predominantly by the Air Traffic/Traffic Management end users. Absent nationally supplied training, facility personnel developed training in support of, and unique to their individual application. Training varied by location and a noticeable lack of national standardization was present.

- **Cultural** challenges became apparent through dialogue with various TBFM users and their view of the current state of TBFM. Feedback ranged from negative overtures, to a complete lack of trust in the system, to the contrary view of positive statements and a belief that TBFM has underutilized capabilities. As a nexus to the cultural challenges was the noticeable void in **communication** concerning TBFM, the platform, concept of use, design, training and ongoing activities.

- **System Management** concerns associated with TBFM include adaptation and software, as well as TMU staffing and ad hoc time commitments for Subject Matter Experts (SMEs) limited the amount of activity and associated understanding of TBFM that could occur.
- **Lack of analysis capabilities to assess effectiveness**. A lack of System Indicators opens the door to challenging the validity of TBFM use, successes associated with TBFM, and understanding of potential impact of not utilizing TBFM. Lack of metrics results in a non-quantifiable assessment of what TBFM delivers. Locally, there is a need for replay and trial planning capabilities to assess outcomes with TBFM.

TBFM deployment occurred without the benefit of clearly communicated direction concerning national or strategic priorities. Notwithstanding this, TBFM capabilities have been embraced in many locations. Where TBFM is employed, however, it is with a tactical level or facility oriented priority. Addressing the issues in the aforementioned areas is foundational to developing a more strategic, and national approach to TBFM that will support NextGen initiatives such as Optimized Profile Descents (OPDs) and other Performance Based Navigation (PBN) enhancements.

2. Introduction

2.1. Study Group Purpose

The TBFM Study Group was formed under the direction of Air Traffic Procedures (AJV-8) to assess the current status of TBFM in the NAS. Several NextGen Operational Improvements (OIs) are dependent upon the successful implementation of time-based flow management so it is essential that these improvements are supported by a strong foundation. The TBFM Study Group received support from the Vice Presidents across all Service Units, demonstrating a universal priority concerning TBFM. The Study Group was not evaluating performance of facilities or specific organizational elements, but rather assessing the current use, benefits, challenges, obstacles, and connectedness in delivering and managing TBFM.

Prior to this report, shortcomings regarding TBFM have existed and been identified at various levels. Documentation has not been formalized. Local efforts were undertaken to solve local issues and local solutions were implemented, however, consistency throughout the NAS has not been realized. The connectivity of TBFM in the NAS and the importance of today's TBFM platform to support the future are beginning to be recognized and positive engagement across organizational lines has begun.

2.2. Study Group Process

The TBFM Study Group convened in February of 2014 and formulated an approach to conduct the study. What resulted was the methodology listed below with many of these elements occurring simultaneously:

- Gathering and reviewing existing documentation of the TBFM system (literature review)
    - Post Implementation Reviews (Draft)
    - National TBFM Operations Team Site Visit Reports
    - User Satisfaction Surveys from September 2013
    - TBFM Procedures as contained in JO7110.65 and JO7210.3
    - Air Traffic Safety Action Program (ATSAP) reports

- Briefings and meetings with key TBFM stakeholders
    - National TBFM Operations Team
    - Program Management Office (PMO)
    - TBFM Training Team
    - Technical Analysis and Operational Requirements Group
    - Airlines for America (A4A)
    - National Business Aviation Association (NBAA)
    - PASS representative for TBFM
    - Metroplex Lead

- Site visits and telcons with TBFM users and facility personnel
    - Air Traffic Control System Command Center (ATCSCC)
    - 15 Centers (ZDC, ZTL, ZNY, ZAU, ZID, ZOA, ZAB, ZDV, ZMA, ZME, ZLA, ZMP, with study group members from ZBW, ZJX, ZOB)
    - 6 TRACONs (A80, N90, NCT, PHL, SCT, with study group member of I90)
    - The cross-section of personnel interviewed included ATMs, TMOs, STMCs, TMCs, CPCs, POFM, Tech Ops

- Review of available TBFM performance data
    - TBFM Performance Summary (MITRE)

The criteria used for site visit selection included locations of significant operational volume and complexity, locations of known usage, locations where usage has diminished or is not being used, or known innovative application.

The group attempted to circulate a field survey to reach a wider cross-section of the TBFM user population. The time required to finalize, circulate, receive, and process responses fell outside the timeframe that the study was allotted.

The culmination of the above information has resulted in the TBFM Study Group's assessment of the current state of TBFM in the NAS today.

This report contains information and observations from the Study Group with the uniqueness of this report being a cross sectional view of how TBFM looks from as many vantage points as possible. The Study Group believes the information will assist in determining immediate needs and longer term solutions.

TBFM Study Group Members

Field support:

- Sherrie Callon, STMC detailed from ZJX as Project Manager, ANG-C
- Edmund de Lacy, Traffic Management and Executive Officer, ZBW
- James Gomoka, Traffic Management Officer, ZOB
- John Gough, Integration and Efficiency Specialist, AJR/WSC
- Eric Owens, NATCA TBFM Article 48 Representative, I90 TRACON

Headquarters Support:

- Maurice Hoffman, Deputy Director, Air Traffic Procedures, AJV-8

MITRE CAASD Support:

- Mike Borowski
- Jay Conroy
- Elizabeth Lacher

3. TBFM System Overview

3.1. System Description

Time Based Flow Management (TBFM) is a Traffic Flow Management automation system designed to regulate the flow of air traffic to a meter point based on time. TBFM replaced the legacy Traffic Management Advisor (TMA) system. TBFM is an enabling technology which will support the achievement of several NextGen Operational Improvements.

TBFM is a tool that facilitates flow management. TBFM scheduling can be applied to departures as well as arrivals into an airport. Its time-based metering and scheduling capabilities are designed to replace space-based (distance based) Miles-in-Trail restrictions. TBFM induced a change from a visual frame of reference with a distance based display and move to an automation-developed, time based system to regulate traffic flows. In today's environment, TBFM's primary end users are the Center Traffic Management Coordinators (TMC) and, during airborne metering operations, Center controllers working traffic flows approaching major terminals. At several TRACON and Air Traffic Control Tower (ATCT) locations, Traffic Managers (TMs) have access to TBFM displays allowing them to monitor demand. N90 and PHL TRACONs are unique in their ability to be TBFM controlling facilities.

TBFM comprises several different capabilities:

- **Arrival Management**: TBFM allows TMs to monitor expected loads and spacing of aircraft across meter fixes and at the runway. TBFM timelines and planview displays provide the user overall situational awareness to enable the user to make appropriate adjustment to the flow as needed.
- **Airborne Metering**: TBFM calculates delays that need to be absorbed by airborne flights in order to achieve desired spacing at the runway or a designated deconfliction point. These delays can be displayed at appropriate ARTCC controller positions; the controller decides how to best apply or absorb the desired delay (e.g., speed adjustment,

vectoring, or holding). Sector controllers issue control instructions to aircraft to meet the time of arrival (or absorb the specified delay time in the airspace).

- **Departure Scheduling**: For flights departing into the arrival stream, TBFM can determine where the departure will fit into the arrival stream, and calculate any appropriate ground delay which will enable the flight to merge smoothly into the arrival stream. The assigned departure delay is relayed verbally from the TM to the tower controller.
- **En Route Departure Capability (EDC)**: TBFM also provides the ability to schedule departures into an en route flow destined to a pre-defined location in en route airspace (usually a Center boundary) to ensure desired spacing at the boundary crossing. Similar to the departure scheduling capability, EDC determines where the departure will fit into the overhead stream and how much ground delay needs to be absorbed. The delay is communicated verbally to the tower controller. Typically, EDC is used to manage a mile-in-trail restriction.

Table 1. Summary of TBFM Capabilities

TBFM Capability	Operational Impact	Operational Benefit
Arrival Management (Situational Awareness)	TMU monitors TBFM assigned times; communicates with area supervisor as needed to balance flows/ mitigate delays	Maintain operational Situation Awareness supporting transition from en route to terminal environment
Airborne Metering	Metering information is sent to controllers via ERAM/Host. Controllers issue instructions in order to meet times.	Controlled delivery across facility boundaries to support airport throughput efficiency gains
Departure Scheduling (into arrival stream)	Tower calls Center for release time; TMU provides release time	Smooth integration of departures into arrival stream
En Route Departure Capability (EDC)	Tower calls Center for release time; TMU provides release time	Smooth integration of departures into overhead stream

3.2. Next Gen Dependencies

TBFM is viewed as a foundational element to the Next Generation Air Transportation System (NextGen) success as the NAS transitions to NextGen. Time based trajectory operations enable Performance Based Operations (PBO), ADS-B applications, and creating greater predictability in the NAS.

Metroplex, formally Optimization of Airspace and Procedures in the Metroplex (OAPM), is a collaborative effort that will use NextGen technology and procedures to make air traffic control more efficient. One component of OAPM strategy is the use of TBFM to manage arrivals on OPDs and the complexities of managing arrivals on dual route OPDs.

There are NextGen initiatives that require TBFM software upgrades to achieve their capability. These include Closely Spaced Parallel runway Operations (CSPO), Wake Turbulence Recategorization (RECAT), parallel operations with super-sized aircraft (e.g., A380), and the ability to manage window altitudes on the OPDs being deployed under the Metroplex project.

There are specific near term TBFM enhancements which support NextGen Operational Initiatives. These enhancements are dependent on a strong foundation in order to function properly:

- Ground-Based Interval Management (GIM) is a TBFM enhancement that will be integral to Trajectory Based Operations and will tested at ZAB with an anticipated IOC date of September of 2014. GIM relies on TBFM to produce the scheduled time of arrival (STA) at a meter fix for which a speed solution is developed. The speed solution is then provided to the controller through ERAM to meet the TBFM developed STA. Airborne metering is required for GIM success, however ZAB only uses TBFM for departure scheduling to PHX and they do not currently conduct airborne metering to PHX.

- IDAC is another TBFM enhancement, and target deployment is expected in fall 2014. It supports NextGen Integrated Arrival Departure Airspace Management and it automates the process of monitoring departure demand and identifying departure slots. IDAC coordinates the departure times between airports and provides situational awareness to ATCTs so that they can select from available departure times and plan their operation to meet these times. This includes standard departure flows, departures from multiple airports merging over a common departure fix, and departures merging into an overhead flow.

- TBFM Information Sharing contains air traffic information that is needed by other FAA systems and by the transportation industry. It will be incorporated as part of System Wide Information Management (SWIM).

- Extended Metering reduces the need for mile-in-trail (MIT) restrictions to manage volume. It enables metering where it is not currently possible and supports the NextGen concept of End to End Metering.

- Coupled Scheduling provides additional meter points with de-confliction capability. It was deployed in spring 2011 but is not currently in use at any facility due to adaptation as well as command and control issues. The Extended Metering concept is dependent upon coupled scheduling.

Each of the following are proposed TBFM enhancements that support NextGen capabilities and are still in the acquisition process:

- Metering During Reroute Operations (MDRO)
- Flight Deck Interval Management (FIM)
- Path Stretching
- Airborne Execution of Flow Strategies (AEFS)
- Terminal Sequencing and Spacing (TSS)

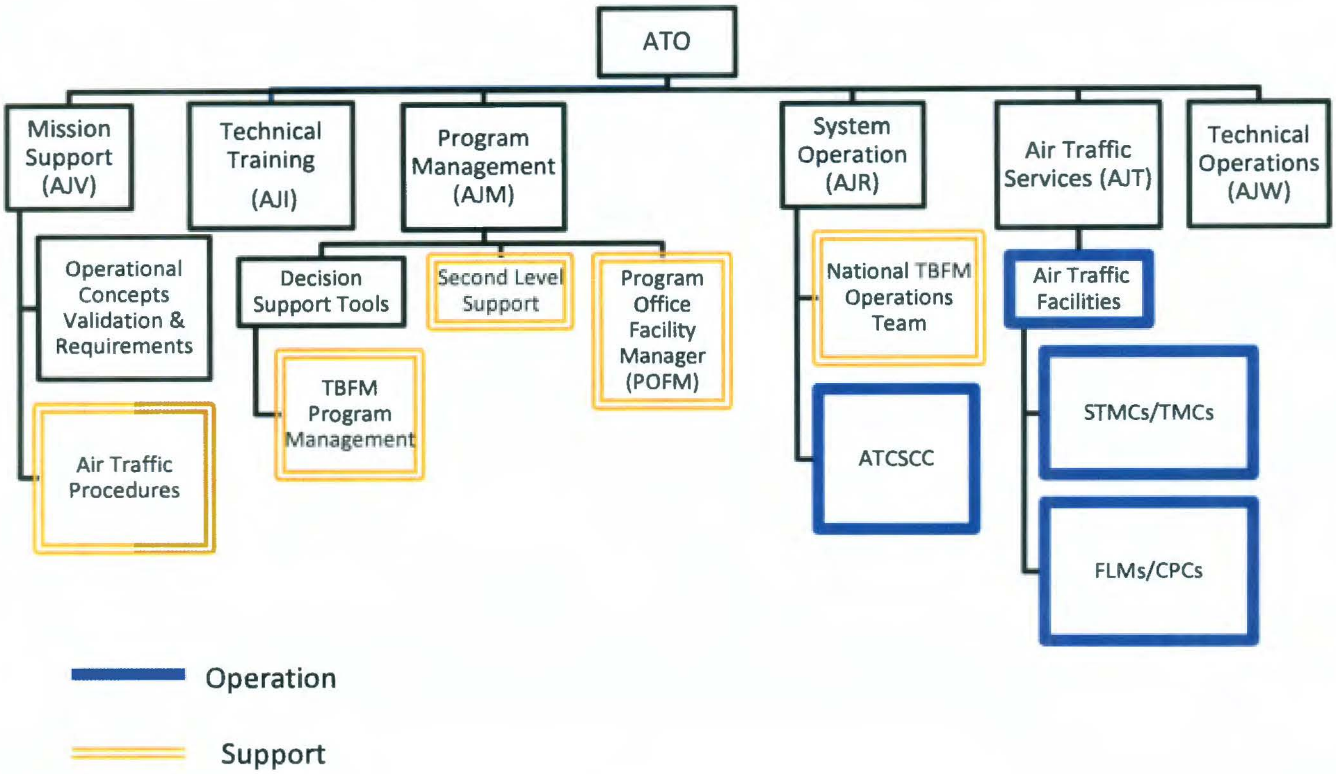
It is a NextGen assumption that a fuel efficient, trajectory-based NAS will be managed with a time-based system to increase efficiencies and provide for a more predictable NAS.

Impact: Without the full utilization of TBFM as a NextGen foundation, many of the benefits identified within the NextGen Implementation Plan may not be realized. For the benefits to be realized, TBFMs time-based capabilities must be employed and mastered to create the higher degree of predictability expected in the future NAS.

3.3 TBFM Organizational Components

The TBFM organizational structure is shown below. Each of the Service Units under the ATO have an influence over the TBFM program and need to work collaboratively to make TBFM successful.

ATO Service Units Influencing TBFM



NextGen Operational Initiatives related to TBFM are delivered by Mission Support (AJV) through Operational Concepts and Requirements (AJV-7) to the Program Management Office (PMO).

The PMO is responsible for the overall management of TBFM investment analysis and system development including selection and oversight of the lead contractor. The PMO manages sustainment of the current system, defines requirements for new capabilities, and develops training on enhancements. The PMO provides a Program Office Field Manager (POFM) to each facility. One of the POFM's duties is to support TBFM adaptations and new software releases. The POFM has a Facility Automation Support Team (FAST) who provides software support to the facility for all Air Traffic automation systems.

Second Level Engineering (SLE) support is provided for complex technical software and hardware issues. SLE support is provided by the PMO and is located at the Tech Center.

The TBFM National Operations Team is part of the System Operations Service Unit. The National Operations Team priority is to provide support to the PMO ensuring new software releases meet operational needs. Additionally, they support Mission Support in development of concepts, review Safety Risk Management Documents (SRMD) related to TBFM, participate and provide assistance to various organizations in the planning, execution, and evaluation of the

TBFM program. The team works with facility representatives, automation specialists and contractors, for the development, integration, expansion and/or operation of TBFM.

Local Technical Operations personnel (TechOps) provide hardware and software installation support to Air Traffic automation systems.

Local operational support for TBFM consists of in house SMEs, generally TMCs and STMCs.

4. Current TBFM Status: Deployment and Use

In August 2013, the FAA announced that Time-Based Flow Management (TBFM) had been deployed to all 20 en route centers, replacing Traffic Management Advisor (TMA) as the time-based metering tool. Additionally as of March 2014, TBFM has been installed in 30 TRACONs and 37 ATCTs[1].

The Air Traffic Control System Command Center (ATCSCC) does not have TBFM equipment, and is still working with the legacy TMA equipment. ATCSCC has access to TBFM data through a Virtual Network Computing (VNC) capability. The VNC is adapted for select sites at select workstations and does not allow ATCSCC interaction with the TBFM system. Additionally, the ATCSCC only has access to data for a limited number of adapted airports and does not have access to EDC data.

The TBFM Study Group visited or talked to representatives from 15 of the 20 ARTCCs where TBFM has been installed, as well as six TRACONs, and the Command Center. The use of TBFM varies greatly by facility. Contributing to the variance in usage are the operational issues/challenges which are identified in Section 5.

In general, the study group learned that the departure scheduling capability of TBFM was widely used and appreciated. Users reported that TBFM provided good release time with departures merged smoothly into the arrival flow, and reduced holding and vectoring. In fact, in several facilities users stated that departure scheduling alone was sufficient to manage the arrival flow. Similar remarks were stated about the en route departure capability (EDC). For those facilities that provide airborne metering times to controllers, perceptions varied about the utility of the tool. The study group heard comments that ranged from "metering provides a good product" to "the tool is a joke".

In Table 2, below, the destinations where TBFM is regularly or occasionally used is identified by TBFM capability (regular use is shown in **bold,** occasional use is shown in *italics.)* For each facility TBFM use was determined based on interviews with local personnel, observation of the TMU, review of available metering data, and other available documentation.

[1] The TRACONs and Towers where TBFM has been deployed are listed in Appendix 8.2

Table 2. TBFM Use By Center

ARTCC	Arrival Management[2]	Departure Scheduling	Airborne Metering[3]	En Route Departure Capability (EDC)
ZAB	**PHX**	**PHX**	*PHX*	**Regular**
ZAU[4]				
ZBW	**BOS**	**EWR, LGA, PHL,** *BOS*	**BOS, EWR, PHL**	**Regular**
ZDC		**CLT, ATL, LGA, DCA, EWR**	**EWR, CLT,** *PHL*	**Regular**
ZDV	**DEN**	*DEN*	**DEN, SLC**	
ZFW	**DFW**		**IAH,** *DFW*	*Occasional*
ZHU	**IAH, HOU**	**IAH, HOU**	**IAH**	**Regular**
ZID		**ATL, CLT**	**ATL, CLT**	**Regular**
ZJX		**ATL, CLT,** *FLL*	**ATL, CLT**	**Regular**
ZKC				
ZLA	**LAS, LAX, SAN**	**LAX, PHX, LAS, SFO,** *SAN*	**LAX, LAS, PHX**	**Regular**
ZLC	**SLC**	*SLC*	**SLC,** *SFO*	
ZMA	**FLL**	*FLL*	**FLL**	**Regular**
ZME	**MEM**	**ATL**	**ATL**	*Occasional*
ZMP	**MSP**	*MSP*	*MSP*	
ZNY			**PHL, EWR**	
ZOA	**SFO**	**SFO**	**SFO**	**Regular**
ZOB	**DTW**	**PHL, LGA, DTW, EWR**	**EWR, PHL**	**Regular**
ZSE	**SEA, PDX, BFI**	*SEA, SFO*	*SEA, SFO*	
ZTL	**ATL, CLT**	**ATL, CLT**	**CLT**	**Regular**

[2] Arrival management includes the active monitoring of the TBFM timeline and resolving/or managing the problems noted by traditional means. This could include observing a bunching of aircraft on an arrival steam and the TM pointing this out to the FLM/CPC with a recommendation to spread them out, or observing heavy loading over a single corner post with the suggestion to offload a few aircraft to ease the load.

[3] Airborne metering means that the freeze horizons are on and TBFM airborne delay data is being sent to ERAM (or the HOST).

[4] ZAU has established a work group that has been tasked with initiating metering for ORD and MDW.

Table 3 shows for each Center, the destinations where TBFM capabilities are available but are used rarely or not at all. The intent of this chart is to highlight the discrepancies between the deployed capability and actual use.

Table 3. Deployed Capability Not in Use

ARTCC	Internal Airports	Adjacent Center Airports[5]	Comments
ZAB		LAX	
ZAU	ORD, MDW	DTW	ZAU has established a workgroup to explore activating TBFM for ORD and MDW
ZBW		DTW, JFK, LGA	
ZDC	IAD, BWI	DTW, JFK, LGA	
ZDV			
ZFW	DAL	MEM	
ZHU			
ZID	CVG	DTW, MEM	
ZJX	MCO		
ZKC	STL	MEM	
ZLA			
ZLC		SFO	ZLC is currently working with ZOA to activate ACM to SFO
ZMA	MIA		
ZME	MEM		
ZMP		DTW	
ZNY	HPN, TEB	DTW, JFK, LGA	ACM to DTW is inhibited by staffing concerns at ZNY
ZOA	OAK	LAX, LAS	
ZOB	CLE, DTW	IAD, JFK, LGA	
ZSE		SFO	
ZTL		MEM	

5. TBFM Operational Issues/Challenges

The study group sorted the data, notes, and observations into logical categories, which were titled Operational Issues. Operational Issues are areas where impediments to TBFM exist, and some commonality was observed across the NAS. The range of Operational Issues spanned a

[5] In order to establish Adjacent Center Metering (ACM), the TBFM system must be resident in both facilities and the associated computers must be able to communicate with each other. Additionally, appropriate adaptation must be constructed for the particular airport. Two Centers which are physically located next to each other may not necessarily be able to use ACM.

wide range of topics. Seven issue areas were identified; they are: Vision, Operational Direction, Policy and Procedures, Training, Culture and Communications, System Management, and Outcome Analysis. Although no single operational issue prevented TBFM usage, the sum of all operational issues is viewed as preventing leveraging TBFM capabilities to support advanced and future NAS initiatives.

5.1. Vision

There is no system-wide unified *Vision* for TBFM that resonated during this activity. The lack of a clearly communicated and understood statement of common purpose, embodying the use of TBFM in the NAS today, understanding of its interconnectivity and a unified future direction, contributed to multiple shortfalls contained in this assessment.

TBFM is a complex system with interdependencies in operation, between the offices and organizations that support it as well as those that are depending on its use for future activities. It was not apparent to the Study Group that involved Service Units, offices, and facilities are actually operating in sync with each other concerning TBFM as it is today, and in planning for the future. Differing priorities exist for such things as use, daily oversight, management, adaptations, and training, as well as priorities associated with incorporating complimentary and dependent procedures and technologies.

The Study Group was unable to locate in writing, nor was there a common understanding that surfaced, that there is a Vision pertaining to TBFM.

Impact: A Vision places definition and reason to what we want to accomplish and establishes a level of priority and focus in the NAS. Absent a unified and shared Vision, different offices, organizations and facilities are establishing different priorities pertaining to TBFM, their workforce and resources. TBFM naturally transcends all boundaries, so where it shows up as a lower priority in locations/offices can disrupt or negatively impact the work within other locations/offices believing the priority was or should have been higher.

5.2 Operational Direction

The study group defined operational direction for TBFM as the setting of priorities and associated policy and procedures for the system to achieve the vision operationally. Operational direction provides leadership and guidance at all levels for coordination and operations to achieve organizational alignment in the application of TBFM.

TBFM was deployed to facilities absent specific expectations of use. It replaced TMA and its enhanced capabilities were adopted to address local needs only. TBFM technology, by its nature, includes aspects of local and more importantly, system-wide application. Facilities that have integrated the TBFM capability for scheduling departures into local operations have done so in order to help meet facility objectives. The TBFM capability to schedule arrival aircraft can extend the management of the flow to adjacent facilities and has been less widely adopted for use. In many cases, conflicting local priorities between facilities preclude TBFM use and benefits. In the absence of operational direction on use or non-use, local direction on application and priority has emerged.

TBFM is a foundation for NextGen initiatives such as PBN procedures and is an integral prerequisite for their success. During the acquisition process the vision for TBFM is provided to

AJV and translated for use in the development of requirements. Requirements are passed to the PMO and translated into software releases and training. A majority of the training has been how to operate the new features of the system. The software releases are passed to the facilities for installation and use. The National Operations Team provides support to the development of software releases.

Once the facilities receive the software update, some level of training is provided, including electronic Learning Management System (eLMS), software goes through an installation process, TMs and CPCs receive some level of training, and what is received is training on the technical aspects of TBFM. Technical aspects are such things as manipulation of new software capabilities and features. The users of TBFM in the facility do not receive an understanding of the vision and direction that TBFM is taking and their associated role. During this process, four ATO Service Units (AJM, AJR, AJT, AJV) impact the development of TBFM, three Service Units impact TBFM support (AJM, AJR, AJW), and two Service Units impact TBFM daily operations (AJR, AJT).

In development, TBFM schedule-driven funding and the push to deliver new software releases on time was stated as a top priority by the PMO and the top priority for the National Operations Team. This push for "the next release" has been at the expense of the field and precluded the flow of information and support on the fielded system. As a result of this, the study group received feedback that the field perceives that they have been left on their own in dealing with TBFM issues.

The PMO receives a myriad of input to the direction of their TBFM efforts. They receive needs, shortfalls, and requests from headquarters organizations and field facilities. Concept development entities propose requirements for additional capabilities. The PMO must develop and field new software releases according to a set schedule. The PMO wrestles with each of the above competing priorities on a continual basis.

At the locations where local training, communication, and roles and responsibilities have been embraced, facilities have reported achieving benefit through the use of TBFM. Larger scale application of focus and direction was not observed.

Impact: A directed strategy for TBFM has not emerged across the NAS. The greater priority for TBFM and its role, and priority in order to fulfill that role have not been made clear. TBFM readiness to support future NextGen capabilities is as a result, lacking.

Without a system approach, the integrity and maximum effectiveness of TBFM is not achieved. For example, if an adjacent center chooses not to participate or terminates their metering to an airport, then the use of adjacent center metering by the remaining facilities must also be terminated. Additional examples include local procedures that allow towers a greater tolerance to meet call for release times, or facility non-compliance with metering times. Without the directed system approach, TBFM capabilities that extend the reach of metering will not being obtained, and current efforts supporting TBFM will not be aligned and prioritized. Operational Direction can alleviate these issues.

5.3 Policy and Procedures

When TBFM was initially deployed as TMA, there were no defined Policies or Procedures on its expected use. The field facilities therefore were left to develop their own individual operating norms. Some field facilities created local procedures in their facility SOPs, however, the majority have not. Without National direction, the foundation was established concerning how, when, and if a given facility would or would not utilize TMA. These decisions occurred locally and were not necessarily connected to a NAS viewpoint.

National guidance was distributed via a Memorandum on March 3, 2011, stating in part that *"TMA, as a support tool, enables effective planning for delivery of aircraft to major airports. It is not a critical system required for what remains our first priority, separating aircraft and issuing safety alerts"*. Although other decision support tools (e.g. URET, TFMS) are in use today without question, the designation of TMA as a decision support tool has been interpreted by some facilities to mean that the use of TMA is completely optional.

In January 2013, National TMA Procedures were published and distributed via Notices FAAO JO7110.612 and FAAO JO7210.832. Content from these Notices were incorporated into FAAO JO7110.65 and FAAO JO7210.3 providing direction for both the ATCSCC and field facilities pertaining to TMA. Relevant content is listed in appendix 8.4.

Observations, discussions and interviews revealed most field facilities are not in full compliance with the current directives and procedures. The reasons varied as to why this is occurring. Reasons cited by facilities included; not being aware of the existing procedures, a lack of sufficient resources to fully implement the procedures, a lack of confidence in TBFM technology, an insufficient knowledge level as well as the lack of National Training.

The challenges with adherence to the current procedures also extended to the ATCSCC and their role and responsibilities associated with TMA. Observations, discussions and interviews at the ATCSCC highlighted the belief they have not been equipped, resourced, or trained adequately to fulfill their responsibilities as published.

Impact: Having technology in the field without defined procedures resulted in locally adopted use determinations. Some of the locally adopted procedures are in conflict with current requirements contained in JO7110.65 and/or JO7210.3. The Decision Support Tool declaration and the actual National Procedures have also been used as a means to justify the non-use of TBFM at locations.

Inconsistent application of the existing procedures within facilities and across facility boundaries may also be contributory to facilities becoming jaded towards the system value or belief that there is no need for TBFM. The lack of procedural integrity through inconsistent application has devalued the perception of the importance of those procedures.

5.4 Training

There is no comprehensive operationally based National Training available for TBFM. The study group received a briefing from the PMO on new training initiatives undertaken by the PMO to mitigate this gap. The desire of the initiative is to achieve standardization in concepts for TBFM, provide detailed TBFM feature descriptions, instruct on the relationship between TBFM features and adaptation, and promote standard usage of TBFM.

The new training will involve three courses, one for Cadre and SMEs, one for TMC, STMC, and ATCSCC specialists, and one for ATC specialists and Front Line Managers. The Cadre course expects to enroll 100 Cadre per year for two weeks of classroom training. Cadre will provide training back to their facilities with the help of a TBFM Stand Alone Trainer, which will facilitate training on existing TBFM systems in facilities, as well as video from the Cadre course. This training is expected to be fielded in the fall of 2014.

What national training the facilities have received on TBFM has been inadequate and facilities developed their own site-specific training to supplement in the absence of national guidance. TBFM training that present-day TMCs and CPCs receive runs the range from briefing, to OJT, self-initiated study, and eLMS. As a result, the quality and depth of the TBFM knowledge conveyed to the TMC or CPC is dependent on the types and means of training that is provided. Consistency across facilities could not be determined. Not unlike other traffic management training, the study group noted that TBFM training is usually conducted outside of the facility Training Departments and is not well documented.

New software releases are accompanied by eLMS modules for training the facility. Of note, the eLMS training provides technical information on changes to existing functionality and new capabilities, however, there is no fundamental training for the user to refer back to. Feedback was that the current distribution of training for releases for enhancement was considered inadequate, especially the use of eLMS. Noted during the study was a known eLMS anomaly that generates confusion with the training. Many TMCs reported that they thought the eLMS was broken: When returning to finish the TBFM training that they had started, it showed them as complete.

In general TMs felt that a larger view of the TBFM concept and delay management is needed. TBFM training is not included in the description of FAA 50113, National Traffic Management training course, or FAA 50115, Enhanced Traffic Management Coordinator course. The requirement of JO3120.4 pertaining to Facility Traffic Management Qualification and Certification is achieved with locally developed content. Local course structure is provided through Course 55116, parts A and B: however, neither of these sections addresses TBFM. In addition, there is no formal refresher training established for TBFM.

The study group observed a need for ARTCC and TRACON TMs to have a better understanding of each other's operations; however, in some TRACONs, and also in some ARTCCs, TMs stated that TBFM is an en route tool only, implying training is not as important for the TRACON. The comments from ARTCCs and TRACONs revealed an unequal understanding of TBFM. Some facilities were versed in adjusting system settings to meet changing conditions and understood the impact of adjustments, while others had little insight. It was articulated that there is a lack of understanding what TBFM is doing under the hood, or how the system functions.

National Operational TBFM training was also missing in regard to developing higher level SME knowledge within a facility. Local SMEs were observed to be self-trained, and the duty was often assigned to personnel who demonstrated an ability or interest in the technology and application of TBFM. In many cases SMEs referred to the system manuals to increase their knowledge and understanding of the TBFM technology. Most of them felt that the bulk of their knowledge had been acquired through trial and error in managing the system. At many of the facilities that employ TBFM, there were less than a handful of TMCs that were considered

SMEs. Several sites the study group visited did not have a designated SME. Moreover, facilities did not know where to go beyond their local resources and informal networks for additional help.

TechOps and FAST personnel felt the training they have received lately is adequate, but the original training was poor. Most felt they did not have enough personnel trained on the system and in several instances the installation of releases had to wait until qualified personnel were available.

Impact: The current training situation has led to a disparity in the understanding of the capabilities and use of TBFM. This has resulted in less than full use of the technology, inconsistencies in multi-facility operations, negative learning, and the inability to expand the application and build upon the capabilities provided. Differing perspectives on use and settings have led to conflicting priorities and overall underutilization of the tool.

5.5 Cultural / Communications

5.5.1 Cultural

The Study Group used the term cultural to include the organization's shared values, attitudes, and practice. In the context of TBFM, cultural factors include such things as individual attitudes, and confidence in accomplishing the work, facility norms, having control of a situation, and responsibility.

The culture has manifested itself with TBFM in the tendencies for facilities to focus on local problem resolution rather than a system approach, a lack of understanding of the value or purpose of TBFM, a lack of confidence in TBFM, and a lack of shared vision and common goals in managing the effectiveness of the NAS.

In facilities that utilize TBFM, they have adapted to their own version of how the tool should be used and determined what level of use is acceptable. The usage however, is as localized as the facility with the controlling responsibilities dictates, and regardless of the effects the decision may have on other facilities.

In practice, many facilities feel that the use of scheduling departures to a timeline is sufficient to meet either the arrival flow or assist in accomplishing Mile-In-Trail (MIT) requirements. Additionally, the time-based metering is a change from the space-based nature of MIT. This is in contrast to facilities that have adopted the use of airborne metering as the norm. Another diverging viewpoint is the overall consideration for the differing priorities placed on departure or arrival flow management by different facilities. These different views affect how, if, when, or why TBFM is used at adjacent facilities.

Even with the potential connectedness TBFM has embedded into the NAS, the same connected facilities bring varying priorities which induces system management conflicts that can negatively affect the use of TBFM. Facilities that choose not to utilize TBFM are not challenged. This enables each facility to determine individually if they are opting to participate. From a NAS viewpoint this approach is limiting the potential use and the overall value of TBFM.

Impact: In the absence of operational direction and vision, the cultural aspects have taken over. It has been successful for local application of TBFM, yet inhibits larger, multi-center, and national utilization and application. Absent common values, attitudes, goals, and practices towards TBFM the system will remain at peril to individual needs, wants, and desires reinforcing the current fragmented utilization.

5.5.2 Communications

Struggles with effective communication were present from almost every aspect of TBFM; to/from and between the various facilities, Technical Operations, System Operations, the National Operations Team, the PMO, and the contractor.

During discussion with the PMO and the National Operations Team, there were misconceptions and disconnects about organizational communication. There was no clear process for common tracking of discrepancies, priorities, and other information and then being able to communicate or share that information with all parties. Facilities frequently reported not receiving updates on current status of future releases of software.

The lack of common language between the various groups also had an impact. This was especially noted at the field locations where the SMEs were trying to understand the technical language being presented. In general terms, the flow of information through the POFM provided the necessary communication sharing for the field Tech Ops and FAST teams. It was reported that these teams were obtaining information in advance of the SMEs. This left the SMEs unclear as to what was to occur, what they needed to understand, and the impacts of changes/updates.

Communication and feedback concerning discrepancy reports was a universal gap. Facilities reported a void of information concerning the status of issues. TMs had no understanding if reported issues had been resolved, were being addressed, or if they were not going to be addressed at all.

Operationally, there is no effort to communicate TBFM as a priority in the NAS. Facilities do not share in a common message, instead, there is inconsistent messaging developed locally that either emphasizes the value and need for TBFM or reinforces areas that devalue the technology.

Facilities cited the need to effectively communicate and understand the various matrix settings. Practical application showed the controlling facility populating the matrix while other affected facilities would need to look into the system to see what had occurred but without an understanding of why the various options were chosen. Other facilities believed the system is managed in a "set it and forget it" mode as there is no communication or demonstration of effective engagement to counter that belief.

TBFM technology is not bound by traditional facility boundaries. The distributed nature of TBFM and the inter-facility dependencies during TBFM operations highlights the need for effective tactical communication between facilities. The NTML is often used to coordinate TBFM messaging, but greater dialogue is often needed to support TBFM coordination. The mere passing of information through NTML is not equivalent to verbal communication concerning a system that is facing utilization challenges. Successful TBFM communication efforts that were reported in some locations included: tactical communication between facilities, collaborative efforts to work through issues internally and with other facilities, and facility SME outreach to neighboring facilities for training, procedures, and issue resolution.

Impact: Communication challenges foster disconnects between offices and Service Units as well as between operational facilities placed under pressure to manage traffic more efficiently. This lack of communication reinforces the current disparity in the understanding of TBFM and the need for its interconnectivity within the NAS.

5.6 System Management Issues

5.6.1 Physical layout

A conclusion drawn from site visits was that there is no guidance on placing TBFM equipment in facilities. We observed a range of placement of TBFM displays from front and center for the TMCs, the main focus of their attention, to across the TMU, and even completely out of direct line of sight. In some locations placement appeared to be integrated with the work flow, while in others, TBFM equipment was inaccessible and/or turned off.

Some facilities had placed Timeline Graphical User Interface (TGUI) displays in areas for situational awareness and for communication. Others had integrated the timeline on larger overhead displays. In one facility, a drop from the TBFM support string was placed adjacent to the TMU to enable a form of trial planning. In some facilities it was unclear how the placement of TBFM would support TM oversight of current or future metering/scheduling operations.

Impact: Ineffective placement of the equipment leads to a lack of usage and poor integration with TMU functions. It inhibits management oversight and can impact multi-facility and NextGen initiatives relying upon TBFM capabilities.

5.6.2 Human Resources

TMC resources are required to actively monitor and manage TBFM arrival and departure capabilities. Facility feedback indicated that one TMC could manage 2-3 metering airports as a maximum depending on the level of specific TBFM capability engagement, (e.g. SCM, ACM and EDC). There are no national standards pertaining to this.

There is a perception at some facilities that staffing to manage TBFM in the TMU is insufficient. The study group observed that facilities who seldom or do not use TBFM have assigned other duties as a higher priority for their TMCs. These facilities stated they could shift priorities but at a "cost." The facility indicated that cost could mean a change in priority of service, the need for additional overtime, or greater staffing.

The POFMs we spoke to felt their FAST staffing was sufficient to meet their responsibilities. Tech Ops also indicated their staffing to be adequate for performing their basic functions, however, additional duties, to include participating in telcons, presented a challenge and at times could not be accomplished.

In our discussions with facilities, SLE was frequently categorized as very knowledgeable, but always busy. Facilities reported that questions to SLE were often pushed to a single "go to" person with specific expertise, and responses waited until that individual could be reached for assistance, possibly indicating a need for additional staffing.

The National Operations Team consists of a Management lead, NATCA Article 48 representative, three operational STMCs, and additional administrative and contract support. The cumulative tasking from the PMO, field facilities, and Mission Support appear to exceed their ability to meet those expectations with the current staffing level. At the present time, two additional SMEs have been assigned as adjunct support to the National Operations Team to augment IDAC discussions and development. It was conveyed that the National Operations Team is spread too thin to be effective. Supporting comment from the PMO stated that low numbers of personnel caused contractors to be relied upon for operational under-the-hood knowledge. It was evident that National Operations Team staffing is not commensurate with the workload assigned for field support and new TBFM release fielding.

Local TBFM SMEs are designated at each facility. The number of SMEs per facility varied between one and five, one to two being the norm. SME responsibilities to support TBFM are accomplished without training, defined responsibilities, or dedicated scheduled time to accomplish the tasks. A few facilities were found to have recently developed a proactive succession plan to replace the SMEs as they move to other positions or retire. In one facility, an SME had not been assigned for over a year. There is no national directive that requires a facility to designate or assign a TBFM SME.

Impact: TBFM must be a high enough priority to warrant assignment of both TMC and SME resources. A shortage in either area can result in not realizing the full TBFM capability in operation, less training for the facility, less maintenance, and improper use.

When the National Operations Team is unable to meet all that is asked of them, the impact is felt across the range of the TBFM system. Currently, the field is bearing the brunt of the shortfall, resulting in less testing, training, and information about TBFM. This reduces performance and if the trend continues, will negatively impact NextGen initiatives and future TBFM capabilities in development.

5.6.3 Hardware

TBFM hardware underwent a tech-refresh in 2013. A variance in the quality of the hardware was noted from the facility visits. The range of quality reported spanned "great" to "unreliable."

5.6.4 Software

Concerns about the quality of the software resonated from multiple sources. The software delivered was described as sub-standard from most facilities visited. The PMO indicated that the quality of the contractor work had been insufficient and a letter had been sent conveying the PMO's concerns.

The Program Office has processes in place for testing of new software prior to deployment in the field. The software is tested by the Program Office and the National Operations Team at the contractor testing facility, by the National Operations Team and Second Level Engineering at the Tech Center, and also at a key site facility by local facility representatives with support from the National Operations Team. Feedback from all entities suggested that the aggressive schedule does not allow adequate time for resolving and addressing issues identified during testing. This has generated the impression from the field that requirements were being modified in order to meet a schedule.

When the software is deployed to the field facilities, there is no centralized release tracking or management of who has which version installed where in the field. Facilities use their own discretion on when or if they upload new software. When software is moved from the support string to the operational string, approval authority ranged from the TMO, to STMC, to SME, to POFM, to no operational approval required.

When problems are identified in the field, the process for logging problem reports requires multiple entry in multiple systems: Automation Issues Management System (AIMS), JIRA (a proprietary tracking system), and Distributed Defects Tracking System (DDTS). This was reported to cause confusion and was viewed as an unnecessary duplication of effort. The hierarchy of problem resolution tracks from the FAST to SLE to the PMO and to the contractor as necessary. SLE received praise for their support to the field while feedback concerning lead contractor support was less favorable. According to the PMO, there is room in each software release to fix some field identified issues but, the number of available lines of code was reported to be insufficient to allow for all of the fixes. There is a process to establish the priority of fixes, and there were often differences in opinion on the priorities chosen. It was noted that feedback on the status of problem report resolution was lacking, not timely, and caused frustration. The PMO noted that the operations budget which supports sustainment activities has been cut multiple times.

Impact: TBFM performance depends upon its software. Frustration with the TBFM software discrepancy system results in fewer discrepancy reports and less attention given to maintaining quality software. Reduced sustainment activities can cause a decline in software quality.

5.6.5 Adaptation

Adaptation is the depiction of local airspace and air traffic control routing structure designed to provide a frame of reference for TBFM to conduct calculations and predictions. Adaptations are a critical component of the TBFM system and must be maintained properly in order for TBFM to function correctly.

Some facilities maintained adaptations, while others had not touched them in years. There is no guidance for maintenance and upkeep of TBFM adaptations. There were some instances where a facility reported a healthy process between POFM, FAST, and SMEs but those were few.

Poor version control was mentioned at several site visits. An untimely notification of upgrades (notification of upgrade on the day of the 56 day update) often forced Tech Ops staff to scramble to make it happen.

Impact: Stale adaptations result in poor performance by the system and lack of confidence in the system.

5.6.6 Settings and Displays

TBFM settings are used to calculate the schedule of aircraft arriving at a meter point to achieve the desired flow characteristics. Setting changes can provide flexibility for management of the given traffic scenario. The choice of settings are subjectively determined per facility and impact traffic flows in each facility, often with only ad hoc coordination between facilities. Setting changes are accomplished manually and can be changed dynamically by the TM. Within a facility, there is a range of methods for managing settings. Some facilities provide local guidelines in changing settings, including not changing the settings at all. Nationally, no guidelines on settings have been provided.

The display of metering data to the controller was also found to be inconsistent across the NAS. Options include displaying the meter list, Delay Countdown Timer (DCT) or scheduled time of arrival or any combination that the controller wants to use. The DCT can have varied displays including whole minutes or tens of seconds. Rounding or truncating delay times can be employed. National directives allow the controller latitude to decide how and what metering data they display. There are no established best practices to emulate.

Impact: When facilities develop or alter settings without communication with other affected facilities, operational performance can become degraded and trust between facilities is lost. The lack of guidance can cause confusion and disagreement on how to manage the system. Without a clear understanding of result of changes in the settings to manage arrival or departure flows, TMCs tend to avoid changes that could improve system performance. They adopt a "set it and forget it" attitude.

5.6.7 Outstanding Priority Issues

Input from the field was that there are a number of discrepancies that have been reported. The field was not aware of the status of discrepancies reconciled. A master list of all known TBFM discrepancies from the field and other sources was requested from the PMO; that list is provided in appendix 8.6.

5.7 Outcome Analysis

There are currently limited tools or capability within TBFM to provide support for operational analysis and establishment of best practices from data. This includes a lack of commonly used and accepted performance indicators (system metrics), the lack of a replay capability, and the inability to trial plan TBFM performance in real-time and conduct "what-if" analysis prior to making a change in system settings.

5.7.1 TBFM Performance Indicators (Metrics):

TBFM presently does not have established metrics and hence it is not currently possible to answer the question, *What does TBFM success look like?*

Anecdotal evidence of TBFM system successes was gleaned from multiple facilities by means of commentary. Comments included 'liking it, it is effective at keeping a consistent flow to the runway, no one is complaining, and airborne holding is down.' Others comments were negative, citing over-delivery and inconsistent results.

Correlating TBFM usage to a measure of success has not been defined. There are complexities in functionality, flexibility of application, user preference, and other non-uniform methods that hinder measurement. For example:

- TBFM is one of many tools used by TMCs for managing traffic scenarios
- The TMC interacts with and consults TBFM displays for situational awareness (SA)
- The TBFM can display time for an aircraft to absorb to obtain an ordered and scheduled flow to a meter point
- The CPC executes the schedule developed by TBFM using individual techniques as determined by the situation and the CPC's experience
- A myriad of techniques can be used by both the TMC and CPC to manage traffic

Isolating the specific measurable contribution by TBFM is difficult, as TBFM is but one contributor to the solution developed.

Many factors work against collecting data and developing metrics for TBFM performance. For example:

- The TBFM system does not directly produce data conducive to developing metrics or conducting measurements
- TBFM capabilities are applied differently by each facility
- TBFM use is not constant
- There is no way to measure how an individual CPC or TMC will use TBFM information and how to measure their actions based upon TBFM information
- Not all of TBFM capabilities are applied in all facilities.

The TBFM Study Group was briefed on the research and development into TBFM performance indicators currently in progress. These indicators include of measures of TBFM use and duration, the number of flights impacted by TBFM capabilities, TBFM generated delay, and compliance with TBFM delay assignment. These measures can provide useful insight into TBFM operations, however, they are in research and cannot yet equate to a measure of effectiveness for use of TBFM.

Impact: Without metrics, a common frame of reference for goal setting, evaluation of performance, improvement of procedures, and determining system contribution are not possible. Analysis and process improvement are much more difficult.

5.7.2 Replay capability

The lack of replay capability was brought up at many locations as hindering the ability of a facility to conduct any type of operational review. The use of replay technology is a common means for reviewing other air traffic situations and associated decisions for better understanding and documentation. Replays have also been in use for both training and educational purposes as well as in addressing issues and responding to concerns. Facilities were asking for it.

Impact: The lack of replay functionality inhibits the learning curve systemically, regionally, within a facility, and individually. System and individual performance along with the necessary understanding are lost.

5.7.3 Trial planning capability

There is no dynamic trial planning capability for TBFM. Traffic scenarios are managed in a live mode only. Facilities are asking for this capability as well.

Impact: TMs are hesitant to experiment on a live system that could potentially cause detrimental effects in the NAS. This hesitation creates a loss of confidence in the TBFM system. A result may be utilizing the system in a less than optimal configuration for distributing delays.

6. Additional inputs

6.1 ATSAP

Two years of ATSAP reports that involved TBFM or TMA were reviewed. The ATSAP reports confirmed many of our field observations of a lack of National Training, gaps in Policy and Procedures, and low basic knowledge and understanding of TBFM operations as well as the impact of changes to TBFM parameters.

ATSAP reports specifically referenced:

- A lack of national guidelines
- A lack of accountability
- Several reports documented facilities choosing to opt out of metering
- TRACONs and ARTCCs advising surrounding ACM facilities to ignore the delay times provided by the system
- A lack of standards as it relates to TBFM matrix settings
- Facilities rippling the list excessively and without appropriate coordination thus contributing to delay time fluctuations
- Reports of DCT jumps

Impact: These issues foster a negative view towards TBFM and adds to the lack of confidence and trust by TMs and CPCs.

6.2 Customer

Interviews were conducted with designated representatives of Airlines for America (A4A) and National Business Aviation Association (NBAA) to acquire their perspectives on the use of TBFM in the NAS. The comments from each organization were consistent in many areas. They believe the premise of metering is solid because it improves delivery to the runway. They have observed less holding and less airborne delay when metering is employed and support the use of TBFM as a traffic management tool. Generally they favor TBFM over mile-in-trail restrictions.

Several issues with TBFM that hamper their operations were relayed.

- The number one issue is early awareness of TBFM imposed delays.

  (Note: Planned enhancements are designed to take steps to address the problem. However, it is unclear which data will be available.)

- Customers cited the inability to receive post-event data for analysis as preventing them from identifying the cause of delays, addressing issues, or proposing solutions to excessive TBFM imposed delay.
- Another customer concern is the "double hits" (delay from two TMIs) that flights receive when TBFM for releases is used in conjunction with a GDP. They cited the need for TBFM to communicate with TFMS so there is a system understanding of the total delay a flight incurs.

- NBAA stated a concern that communication on TBFM is very limited between the FAA and with their constituents. NBAA felt that they were routinely left out of discussions that relate to changes in TBFM airports or usage.
- NBAA customers commented on the wide range of TBFM use across the NAS leading to confusion in the basic definition of metering. They cited the need for training for industry that includes the who, what, when, where, and why of TBFM. They were keenly aware of the impact on their operation when OPDs were used in conjunction with TBFM. They believe that additional work may need to be done to truly understand how to manage TBFM with OPDs.

Both parties list several suggestions for improvements.

- A4A suggestions included:
    - Schedule departures when the strip prints to avoid inequitable delays for close-in departures
    - Use customer updates (L-time) from TFMS instead of P-time as a better indicator of departure status
    - Include operators in training for facilities to increase their level of understanding
    - Reconcile the use of TBFM for departure release times with the use of Ground Delay Program. Procedures are needed so customers know what to expect.
- NBAA suggestions include:
    - Add a section to ATCSCC Operation Information System (OIS) that displays TBFM status
    - Add a section to ATCSCC website on TBFM for educational purposes
    - A mobile application that would allow operators from other than controlled airports to request a departure time
    - NBAA expressed the desire to add a section to their website on TBFM help educate their members
    - Include NBAA in discussions about plans for expanding use of TBFM. For example, the deployment of TBFM for TEB.

7. Summary

The information in this report is the culmination of documentation review, briefings and meetings with stakeholders, interviews with key personnel, site visits, and review of available TBFM performance summary information. The information was analyzed and consensus reached by the study group and analysts familiar with the TBFM program.

TBFM capabilities used, the duration of their use, the procedures used, and the level of expertise vary extensively between facilities. These differences are significant. Currently, local TBFM applications are solving local issues so the observed differences between facilities may appear unimportant. TBFM effectively removes traditional boundary constraints and connects multiple facilities in a manner that requires harmonious integration of the technology. The local interpretation and application of TBFM now becomes problematic to NAS wide utilization.

To leverage TBFM capabilities in the NAS, there is a need for a National Vision and associated Operational Direction. New or revised Policy and Procedures will establish standards for use and bring forth a higher level of understanding that does not exist today. Training and Communication will assist in both moving the technology forward and in shifting the cultural challenges identified in this report. Improved system management will strengthen TBFMs base and enable expanded and more efficient support for field users.

While the Study Group recognized the optimistic attitudes and desire to see TBFM move forward at many locations, the timely and effective attention to the challenges presented here are foundational for the NAS to realize enhanced TBFM use and to adequately support NextGen initiatives.

8. Appendices

8.1 Acronyms

8.2 TBFM Installations

8.3 TBFM Data sample

8.4 Policy and Procedures Excerpts

8.5 TMU Layout Diagrams

8.6 List of TBFM Software Issues

8.1. Acronyms

Acronym	Definition
A4A	Airlines for America
A80	Atlanta TRACON
ACM	Adjacent Center Metering
ADS-B	Automatic Dependent Surveillance Broadcast
AEFS	Airborne Execution of Flow Strategies
AIMS	Automation Issues Management System
AJM	Program Management
AJR	System Operations
AJT	Air Traffic Services
AJV	Mission Support Services
AJV-7	ATO Operational Concepts Validation and Requirements
AJV-8	Air Traffic Procedures
AJW	Technical Operations
ANG	NextGen
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATCT	Air Traffic Control Tower
ATM	Air Traffic Manager
ATO	Air Traffic Organization
ATSAP	Air Traffic Safety Action Program
CAASD	Center for Advanced Aviation System Development
CPC	Certified Professional Controller
CSPO	Closely Spaced Parallel runway Operations
DCT	Delay Countdown Timer
DDTS	Distributed Defects Tracking System
EDC	En Route Departure Capability
EDCT	Estimated Departure Clearance Time
eLMS	Electronic Learning Management System
ERAM	En Route Automation Modernization
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
FAST	Facility Automation Support Team
FIM	Flight Deck Interval Management
FLM	Front Line Manager
GIM	Ground-Based Interval Management
IOC	Initial Operational Capability
IDAC	Integrated Arrival Departure Capability

Acronym	Definition
JIRA	JIRA is a proprietary issue tracking product
MDRO	Metering During Reroute Operations
MIT	Miles in Trail
MITRE	The MITRE Corporation
N90	New York TRACON
NAS	National Airspace System
NBAA	National Business Aviation Association
NATCA	National Air Traffic Controllers Association
NCT	Northern California TRACON
NextGen	Next Generation Air Transportation System
NTML	National Traffic Management Log
OAPM	Optimization of Airspace and Procedures in the Metroplex
OI	Operational Improvement
OIS	Operation Information System
OPD	Optimum Profile Descent
PASS	Professional Aviation Safety Specialists
PBN	Performance Based Navigation
PBO	Performance Based Operations
PMO	Program Management Office
POFM	Program Office Field Manager
RECAT	Wake Turbulence Recategorization
SA	Situational Awareness
SCM	Single Center Metering
SCT	Southern California TRACON
SLE	Second Level Engineering
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SRMD	Safety Risk Management Document
STMC	Supervisory Traffic Management Coordinator
STA	Scheduled Time of Arrival
SWIM	System Wide Information Management
TBFM	Time Based Flow Management
Tech Ops	ATO Technical Operations Services
TFMS	Traffic Flow Management System
TGUI	Timeline Graphical User Interface
TM	Traffic Manager
TMA	Traffic Management Advisor
TMC	Traffic Management Coordinator
TMI	Traffic Management Initiative
URET	User Request Evaluation Tool
VNC	Virtual Network Computing

Acronym	Definition
TMO	Traffic Management Officer
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control Facility
TSS	Terminal Sequencing and Spacing

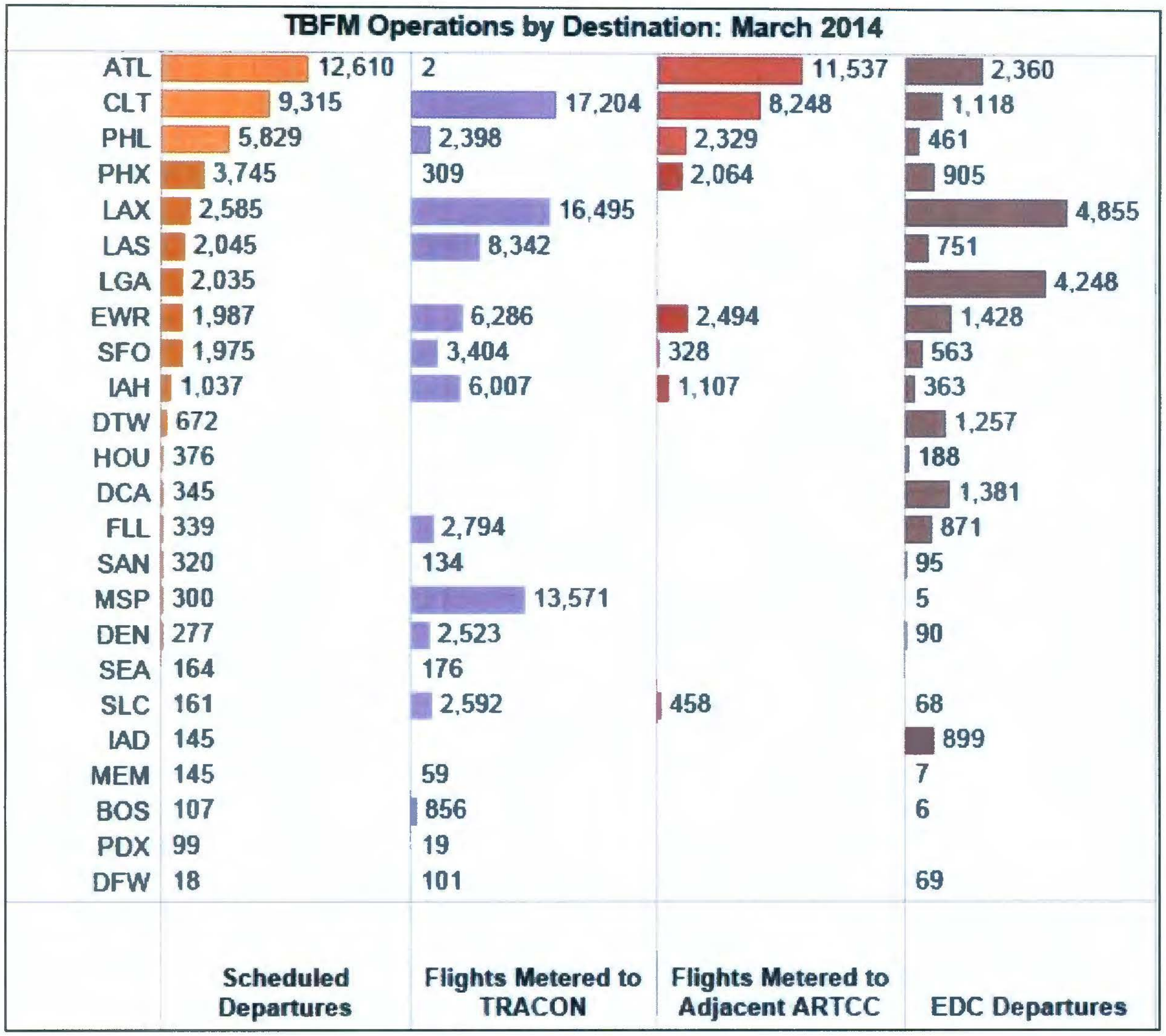
8.2. TBFM Installation in TRACONs and Towers

TRACON
A80 - Atlanta
A90 - Boston
C90 - Chicago
CLE - Cleveland
CLT - Charlotte
CVG - Cincinnati
D01 - Denver
D10 – Dallas
D21 - Detroit
I90 - Houston
L30 – Las Vegas
M98 - Minneapolis
F11- Orlando
MEM - Memphis
MIA - Miami
N90 – New York
NCT – Northern California
P50 - Phoenix
P80 - Portland
PCT - Potomac
PHL - Philadelphia
S46 - Seattle
S56 – Salt Lake City
SCT – Southern California
T75 – St. Louis

Tower
ATL
BOS
BWI
CLE
CLT
CVG
DAL
DCA
DEN
DFW (E)
DFW (W)

DTW
EWR
FLL
HPN
IAD
IAH
JFK
LAS
LAX
LGA
MEM
MIA
MCO
MSP
ORD
PHL
SAN
SEA
SFO
SLC
STL
TEB

8.3. TBFM Data


TBFM Operations by Destination: March 2014
ATL 12,610 2 11,537 2,360
CLT 9,315 17,204 8,248 1,118
PHL 5,829 2,398 2,329 461
PHX 3,745 309 2,064 905
LAX 2,585 16,495 4,855
LAS 2,045 8,342 751
LGA 2,035 4,248
EWR 1,987 6,286 2,494 1,428
SFO 1,975 3,404 328 563
IAH 1,037 6,007 1,107 363
DTW 672 1,257
HOU 376 188
DCA 345 1,381
FLL 339 2,794 871
SAN 320 134 95
MSP 300 13,571 5
DEN 277 2,523 90
SEA 164 176
SLC 161 2,592 458 68
IAD 145 899
MEM 145 59 7
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PDX 99 19
DFW 18 101 69
Scheduled Departures
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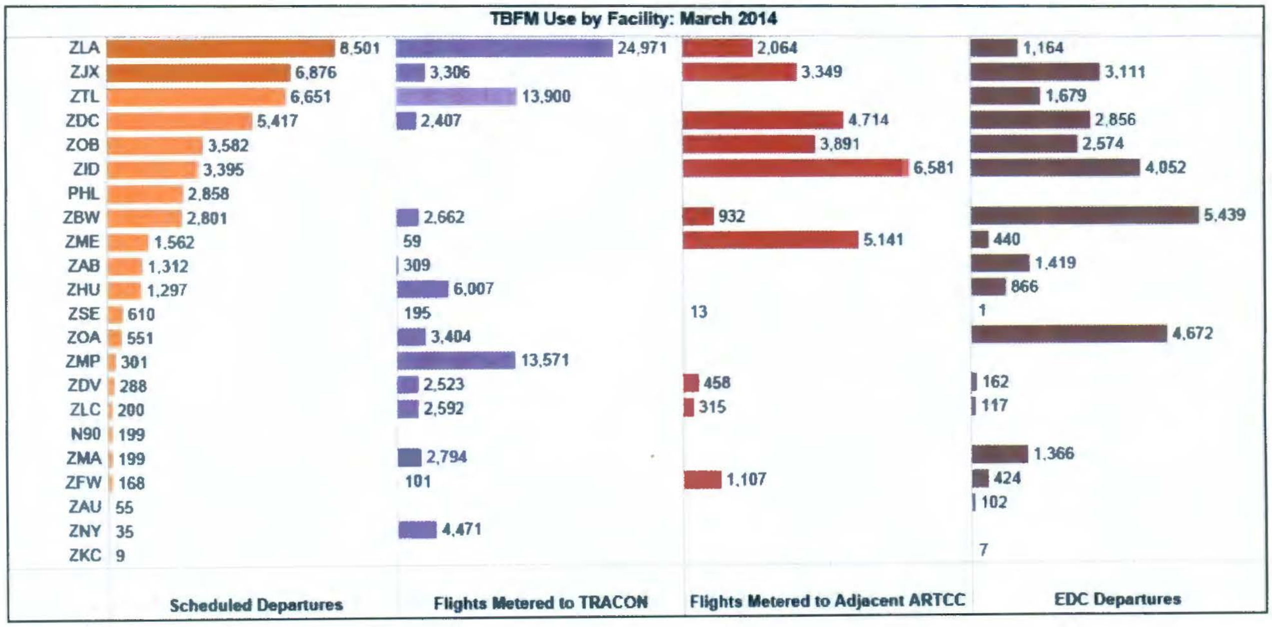
Flights Metered to Adjacent ARTCC
EDC Departures


TBFM Use by Facility: March 2014
ZLA
ZJX
ZTL
ZDC
ZOB
ZID
PHL
ZBW
ZME
ZAB
ZHU
ZSE
ZOA
ZMP
ZDV
ZLC
N90
ZMA
ZFW
ZAU
ZNY
ZKC
Scheduled Departures
8,501
6,876
6,651
5,417
3,582
3,395
2,858
2,801
1,562
1,312
1,297
610
551
301
288
200
199
199
168
55
35
9
Flights Metered to TRACON
24,971
3,306
13,900
2,407
2,662
59
309
6,007
195
3,404
13,571
2,523
2,592
2,794
101
4,471
Flights Metered to Adjacent ARTCC
2,064
3,349
4,714
3,891
6,581
932
5,141
13
458
315
1,107
EDC Departures
1,164
3,111
1,679
2,856
2,574
4,052
5,439
440
1,419
866
1
4,672
162
117
1,366
424
102
7

8.4. Policy and Procedure Excerpts

Air Traffic Control, JO 7110.65

11–1–2. DUTIES AND RESPONSIBILITIES

a. Supervisory Traffic Management Coordinator– in–Charge (STMCIC) must:

1. Ensure that an operational briefing is conducted at least once during the day and evening shifts. Participants must include, at a minimum, the STMCIC, Operations Supervisors (OS), Traffic Management Coordinator(s) (TMC), and other interested personnel as designated by facility management. Discussions at the meeting should include meteorological conditions (present and forecasted), staffing, equipment status, runways in use, AAR and traffic management initiatives (present and anticipated).
2. Assume responsibility for TMC duties when not staffed.
3. Ensure that traffic management initiatives are carried out by Supervisory Traffic Management Coordinator–in–Charge (STMCIC).
4. Where authorized, perform URET data entries to keep the activation status of designated URET Airspace Configuration Elements current.
5. Perform assigned actions in the event of a URET outage or degradation, in accordance with the requirements of FAA Order JO 7210.3, Facility Operation and Administration, and as designated by facility directive.

6. Ensure changes to restrictions based on the Restrictions Inventory and Evaluation are implemented in a timely manner.

b. FLM must:

1. Keep the TMU and affected sectors apprised of situations or circumstances that may cause congestion or delays.
2. Coordinate with the TMU and ATCSs to develop appropriate traffic management initiatives for sectors and airports in their area of responsibility.
3. Continuously review traffic management initiatives affecting their area of responsibility and coordinate with TMU for extensions, revisions, or cancellations.
4. Ensure that traffic management initiatives are carried out by ATCSs.
5. Where authorized, perform URET data entries to keep the activation status of designated URET Airspace Configuration Elements current.
6. Perform assigned actions in the event of a URET outage or degradation, in accordance with the requirements of FAA Order JO 7210.3, Facility Operation and Administration, and as designated by facility directive.
7. Ensure changes to restrictions based on the Restrictions Inventory and Evaluation are implemented in a timely manner.

c. ATCSs must:

1. Ensure that traffic management initiatives and programs are enforced within their area of responsibility. Traffic management initiatives and programs do not have priority over maintaining:

(a) Separation of aircraft.
(b) Procedural integrity of the sector.

2. Keep the OS and TMU apprised of situations or circumstances that may cause congestion or delays.
3. Continuously review traffic management initiatives affecting their area of responsibility and coordinate with OS and TMU for extensions, revisions, or cancellations.
4. Where authorized, perform URET data entries to keep the activation status of designated URET Airspace Configuration Elements current.
5. Perform assigned actions in the event of a URET outage or degradation, in accordance with the requirements of FAA Order JO 7210.3, Facility Operation and Administration, and as designated by facility directive.

d. ARTCCs, unless otherwise coordinated, must:

1. Support TMA operations and monitor TMA equipment to improve situational awareness for a system approach to traffic management initiatives.
2. Monitor arrival flow for potential metering actions/changes and, if necessary, initiate coordination with all facilities to discuss the change to the metering plan.

e. TRACONs, unless otherwise coordinated, must:

1. Support TMA operations and monitor TMA equipment to improve situational awareness for a system approach to traffic management initiatives.
2. Monitor arrival flow for potential metering actions/changes and, if necessary, initiate coordination with all facilities to discuss the change to the metering plan.
3. Schedule internal departures in accordance with specific written procedures and agreements developed with overlying ARTCCs and adjacent facilities.

f. ATCTs, unless otherwise coordinated, must:

1. Monitor TMA equipment to improve situational awareness for a system approach to traffic management initiatives.
2. Release aircraft, when CFR is in effect, so they are airborne within a window that extends from 2 minutes prior and ends 1 minute after the assigned time.

NOTE–
Coordination may be verbal, electronic, or written.

11–1–3. TIME BASED FLOW MANAGEMENT (TBFM)

During periods of metering, ATCS must:

a. Display TMA schedule information on the main display monitor (MDM).

b. Comply with TMA-generated metering times within +/- 1 minute.

1. If TMA-generated metering time accuracy within +/- 1 minute cannot be used for specific aircraft due to significant jumps in the delay countdown timer (DCT), other traffic management initiatives may be used between those aircraft such as miles-in-trail (MIT) or minutes-in-trail (MINIT) to assist in delay absorption until stability resumes.

2. An exception to the requirement to comply within +/- 1 minute may be authorized for certain ARTCC sectors if explicitly defined in an appropriate facility directive.

c. When compliance is not possible, coordinate with FLM and adjacent facilities/sectors as appropriate.

NOTE–
TMA accuracy of generated metering times is predicated on several factors, including vectoring outside of TMA route conformance boundaries (route recovery logic), certain trajectory ground speed calculations, and when TMU resequences a specific flight or flight list. Caution should be used in these situations to minimize impact on surrounding sector traffic and complexity levels, flight efficiencies, and user preferences.

Facility Operation and Administration, JO 7210.3

Section 24. Traffic Management Advisor (TMA)

6–1–7. DISPLAY OF TRAFFIC MANAGEMENT ADVISOR (TMA) INFORMATION

Configure TMA delay information for single–center metering (SCM) or adjacent–center metering (ACM) to display TMA schedule information on the main display monitor (MDM).

17–24–1. PURPOSE

This section establishes procedures and responsibilities for the use of Traffic Management Advisor (TMA).

17–24–2. DEFINITIONS

a. *Adjacent Center Metering (ACM).* An extension of SCM that provides time-based metering capability to neighboring facilities. There are three categories of ACM processing and control at a facility:

1. Controlling facility – The TMA unit that exercises control over SCM and/or ACM settings and the relevant metering operation.
2. Limited Control - The ability to manage specific ACM settings and activities for relevant metering operations.
3. Non-Controlling - A facility that only has monitoring capability.

b. *Coupled Scheduling.* An automation process that adds additional meter-points and allows the linking of time-based flow management (TBFM) systems. This results in more optimal balancing and distribution of delays over a greater distance from the airport or meter point.

c. *En Route Departure Capability (EDC).* A functionality within TMA that assists TMCs in formulating release times to adapted meter points in space.

d. *Metering.* A method of controlling aircraft demand by scheduling the time at which each aircraft should cross a predetermined fix.

e. *Rippling.* The recalculation of TMA–generated, frozen scheduled times of arrival (STA) resulting from a manual action at the controlling graphical user interface (GUI). Rippling, also commonly referred to as "rescheduling" or "reshuffling," can be executed independently but is normally associated with changes to TMA configurations or settings.

f. *Single Center Metering (SCM).* An application of the TMA tool that provides TMCs with the ability to view and manage arrival flows to an ARTCC's internal airports.

g. *Time-Based Flow Management (TBFM).* The technology and methods of balancing demand and capacity utilizing time.

h. *Traffic Flow Management (TFM).* The processes and initiatives a TMC uses to balance air traffic demand with system capacity.

i. *Traffic Management Advisor (TMA).* A comprehensive, automated method of planning efficient arrival trajectories from cruise altitude to the runway threshold.

17–24–3. RESPONSIBILITIES

a. The ATCSCC must:

1. Be the final decision authority for TMA-related operations and initiatives.
2. Manage the equity of overall system delays throughout the NAS.
3. Host/participate in ACM discussions and support all ACM and other time-based metering initiatives. Collaborate on an exit strategy when ACM is no longer required.
4. Include the status of any pertinent TMA-related information on the planning telecons and on the Operational Information System (OIS).
5. Prioritize TBFM activity based on NAS and/or facility constraints.
6. Inform impacted facilities of relevant information that would influence arrival metering decisions or en route EDC operations.
7. Establish and maintain multi-facility communications when necessary for ACM operations.
8. Log ACM events and other TMA activities as appropriate in the NTML.
9. Serve as a repository for TBFM information and TMA reference materials.

b. All TMUs with controlling TMA systems must:

1. Determine appropriate TMA settings.
2. Ensure TMA settings are entered, current, and coordinated.
3. Monitor TMA to determine metering timeframes and coordinate start/stop times and reportable delays with the ATCSCC and affected facilities.
4. Communicate meter start/stop information to operational areas, operating positions, and participating facilities, and enter into NTML as necessary.
5. Enable sector meter list as coordinated.
6. Monitor internal facility metering delays and initiate actions, as appropriate, when values exceed or are projected to exceed delays that can be absorbed by control sectors. Notify the FLM or affected areas/sectors of actions taken and expected outcomes.
7. Monitor multi-metering scenarios. Advise ATCSCC if time based metering (TBM) to multiple airports or fixes is impacting or projected to impact sector or facility level operations.
8. Coordinate changes to the metering plan or updates to the TMA schedule with the affected facilities.
9. Coordinate internally with affected areas and with any ACM supporting facilities before taking action to update the TMA schedule.
10. To the extent possible, avoid making any changes in TMA that cause a global schedule change (rippling) during metering operations. Advise affected facilities and sectors before rippling.

NOTE–
Coordinate and disable the sector meter list when rippling is necessary. Enable the metering list when rippling is complete.

1. Use TMA to determine release times for internal departures to a metered airport.

2. Monitor arrival and departure flows for potential metering actions/changes.
3. Monitor internal and adjacent facility metering compliance and take appropriate action.
4. Coordinate and disable sector meter list when metering times are no longer in effect.

c. Supporting TMUs performing ACM or coupled scheduling must:

1. Determine appropriate local TMA settings.
2. Ensure TMA settings are entered, current, and coordinated.
3. Coordinate with controlling facility and ATCSCC, as appropriate.
4. Communicate meter start/stop information to operational areas, operating positions, and participating facilities.
5. Enable sector meter list as coordinated.
6. Use TMA to determine release times for internal departures to a metered airport.
7. Monitor arrival and departure flows for potential metering actions/changes.

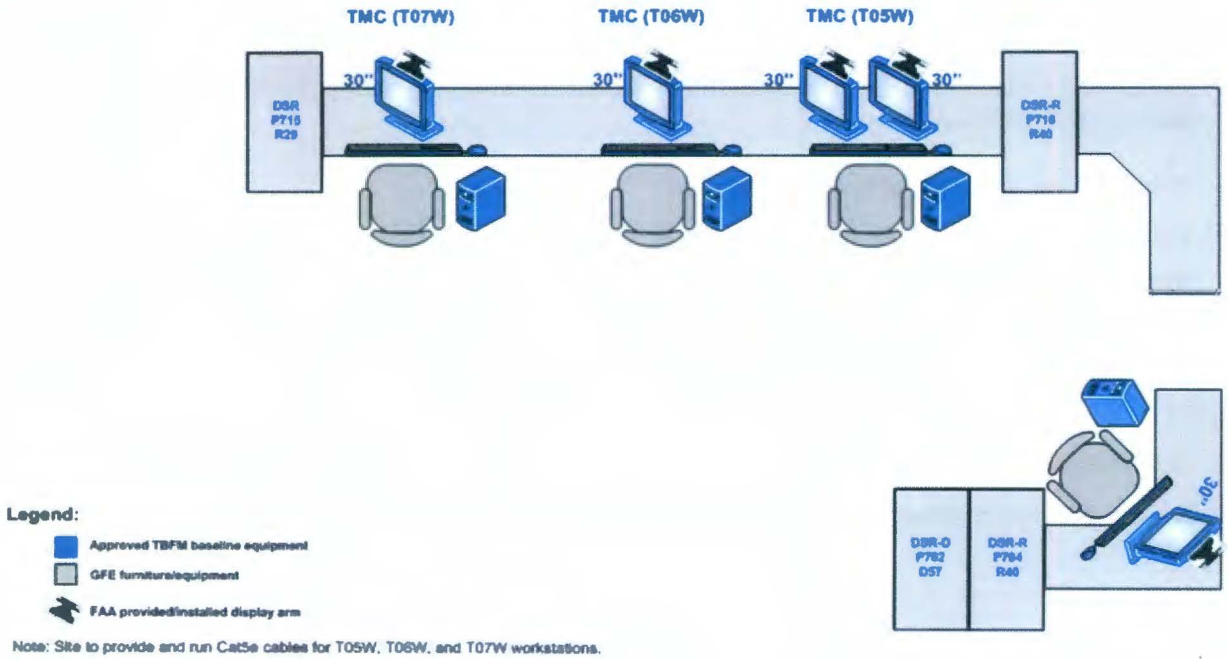
NOTE–
Coordinate and disable the sector meter list when rippling is necessary. Enable the metering list when rippling is complete.

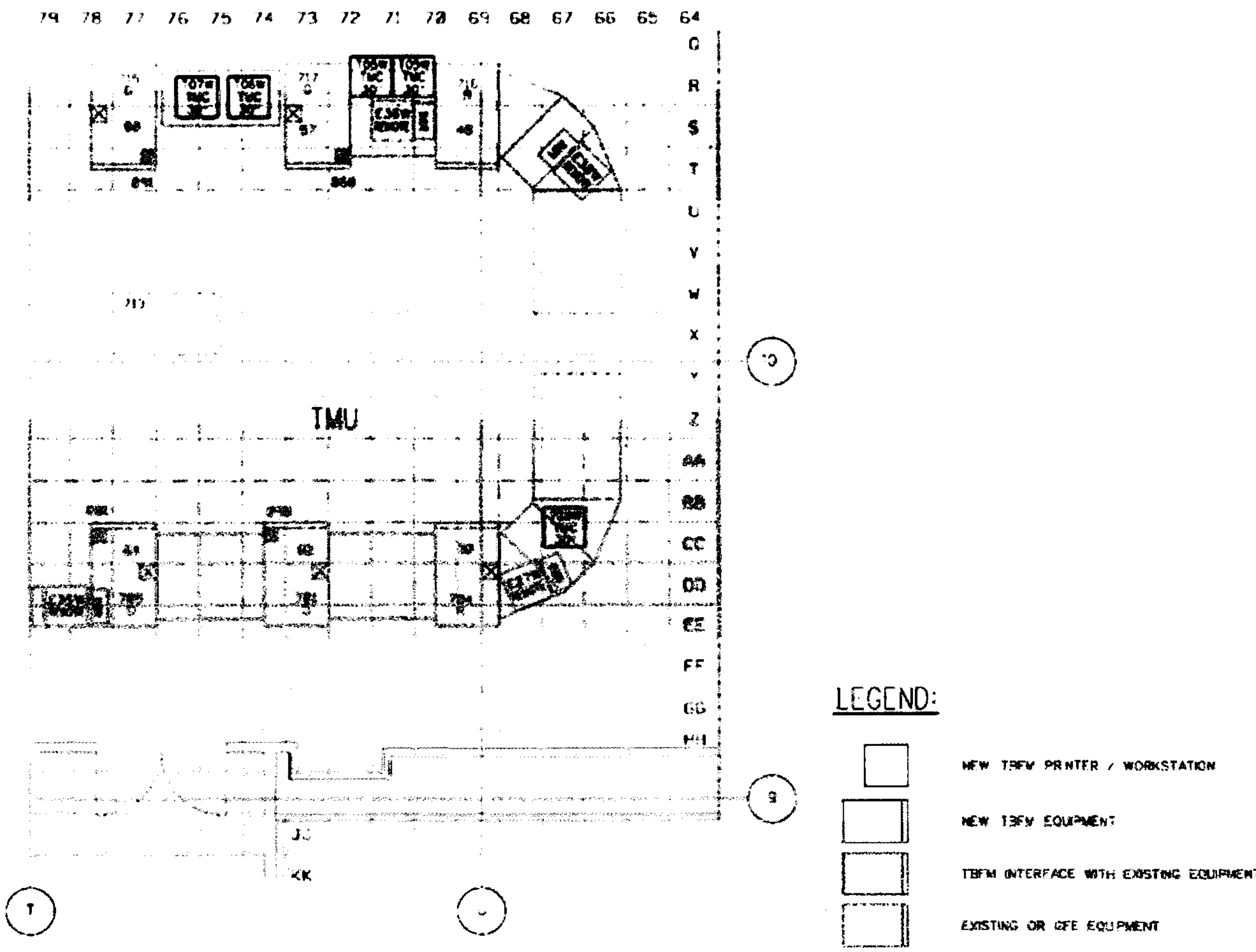
8. Monitor internal and upstream compliance.

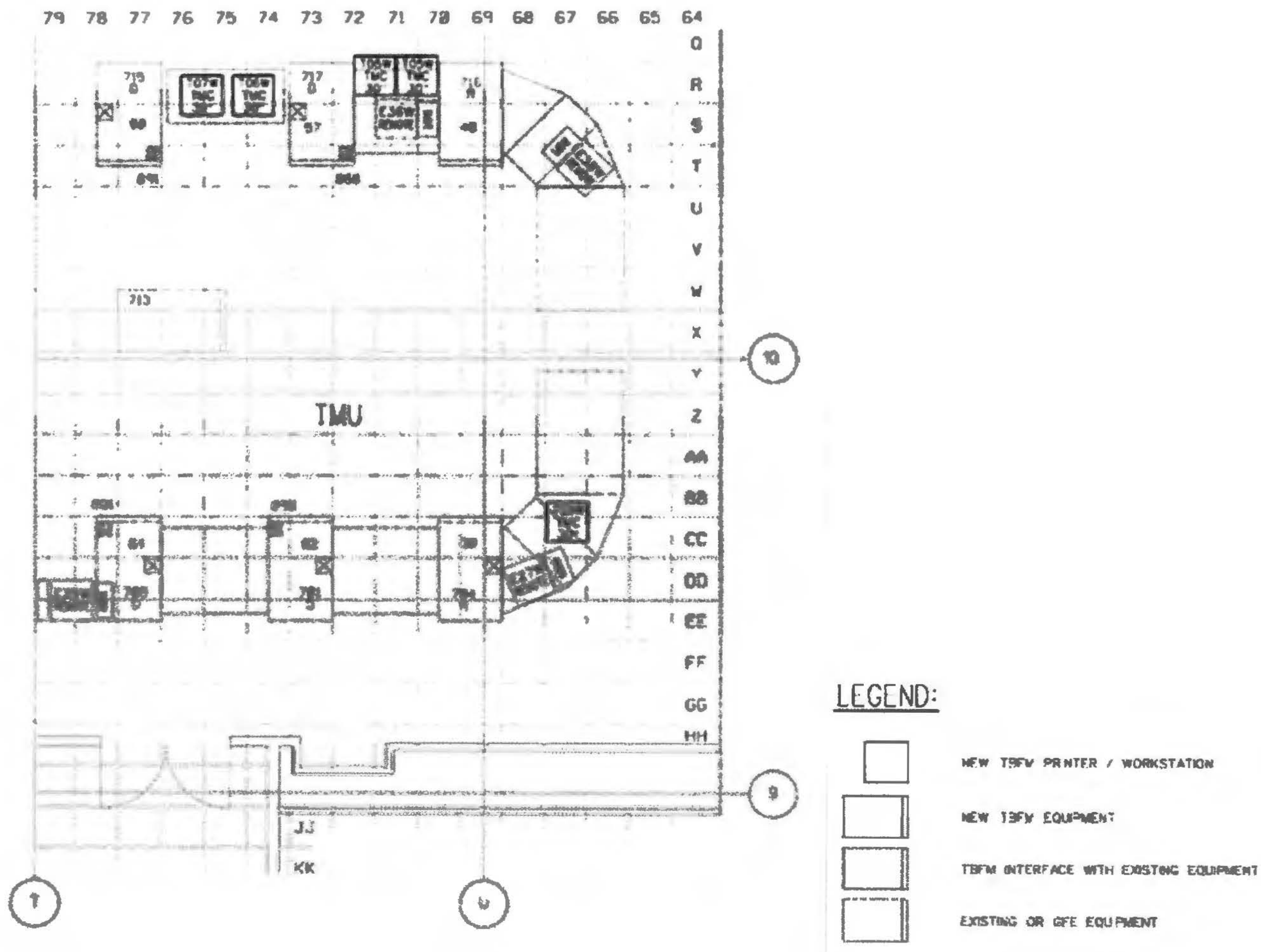
9. Disable the sector meter list when metering has been completed.

8.5. TMU Layout Diagrams

ZNY TBFM OPS String (CW1-TMU)




TMU
LEGEND:
NEW TBFM PRINTER / WORKSTATION
NEW TBFM EQUIPMENT
TBFM INTERFACE WITH EXISTING EQUIPMENT
EXISTING OR GFE EQUIPMENT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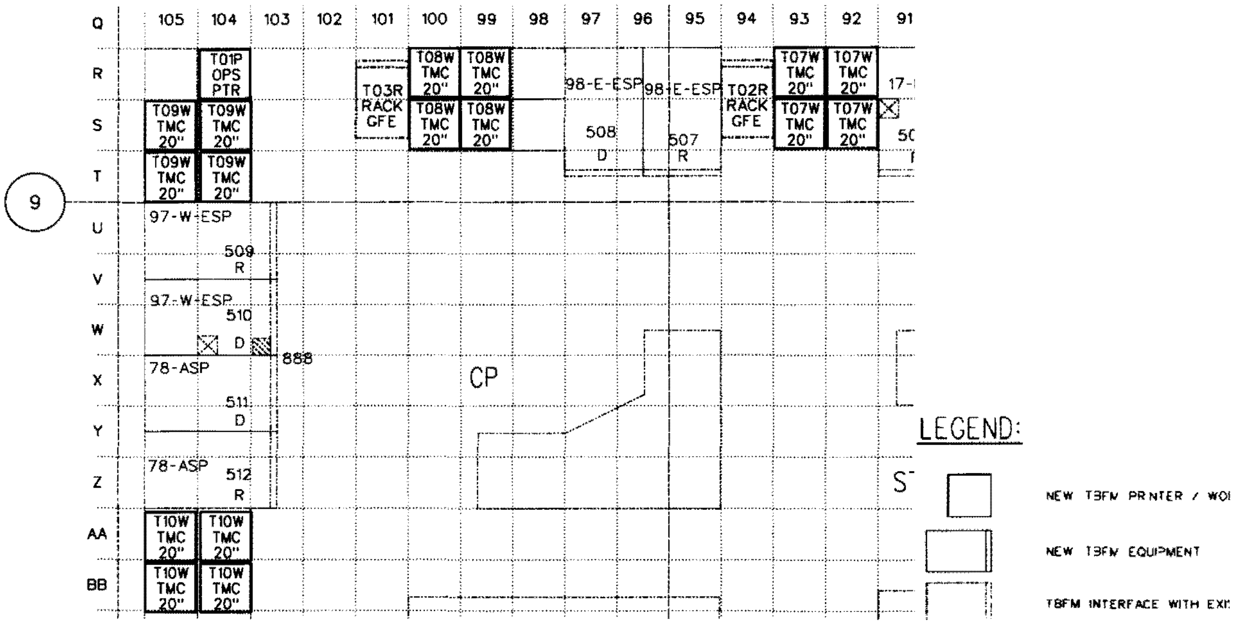
LEGEND:
NEW TBFM PRINTER / WORKSTATION
NEW TBFM EQUIPMENT
TBFM INTERFACE WITH EXISTING EQUIPMENT
EXISTING OR GFE EQUIPMENT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93
92
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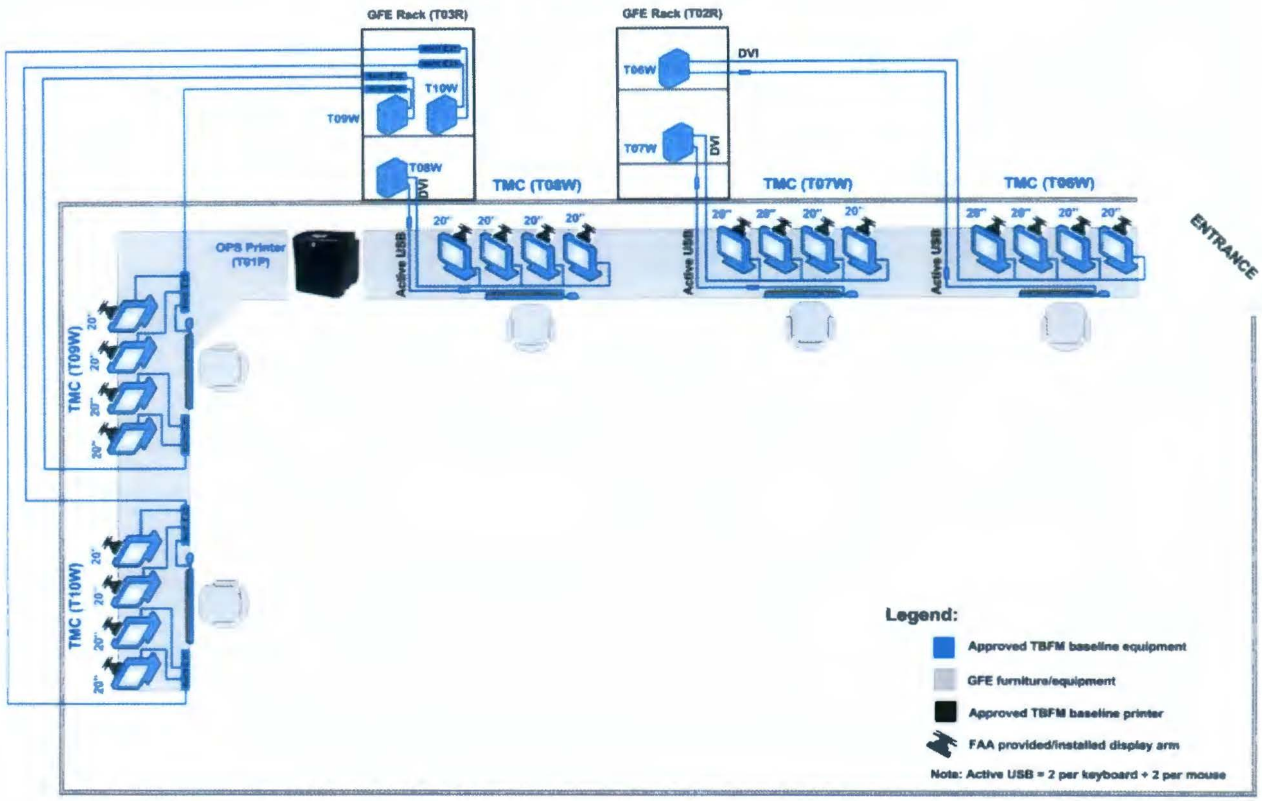
T01P OPS PTR
T09W TMC 20"
T03R RACK GFE
T08W TMC 20"
98-E-ESP
508 D
507 R
T02R RACK GFE
T07W TMC 20"
97-W-ESP
509 R
510 D
888
78-ASP
511 D
512 R
CP
T10W TMC 20"
LEGEND:
NEW TBFM PRINTER / WO
NEW TBFM EQUIPMENT
TBFM INTERFACE WITH EXI

ZOB TBFM OPS String (CW1-TMU)



8.6. List of TBFM Software Discrepancies

SR	Site	Submitted	Problem Summary	STATE	SWG Status
CSCwb08840	ZAB	1240444800	Remove the 10 minute time frame from the PHX System F5 key	Q	TOP5 #1 Approved for intent; build TBD
CSCwb07118	ZAB	1193616000	Model Aircraft Route that would change the OOA	Q	TOP5 #2 Approved for intent; build TBD
CSCwb07117	ZAB	1193616000	Allow numeric entry via the numeric keypad during screen shot capture.	Q	TOP5 #4 Approved for intent; build TBD
CSCwb07077	ZAB	1192579200	Be able to set ACM PGUI - Datablock color by: Outer Outer Arc.	Q	TOP5 #5 Approved for intent; build TBD
CSCwb09162	ZAU	1248825600	TMA ALL-- DCT fluctuations	W	TOP5 #1 New ZOB cases provided from 01/21/10. CSC-NJ reviewed and found issue with ground speed filter. CSC System Engineering is currently reviewing the ground speed filter functionality. Opened PIR CSCnj15014 to capture this issue.
CSCwb07789	ZAU	1209600000	Inability to display TMA data on SATORI or FALCON	Q	TOP5 #1A Approved for intent; build TBD. CSC would need additional information regarding the SATORI and FALCON tools.
CSCwb07815	ZAU	1210118400	Unable to review past data	Q	TOP5 #1B Approved for intent; build TBD
CSCwb08355	ZAU	1226534400	TMA ALL Schedule a Departure Window allows user to take adverse action	I	TOP5 #2 Needs to go to RWG. There has always been code in place that will send a message to a TGUI prompting it to display information text something to the effect that CTAS is currently processing a

					schedule departure related event and cancels the new request. If something beyond this is needed (as indicated in the SR) would be a new requirement.
CSCwb07790	ZAU	1209600000	TMA ORD Unexpected Delay applied to Enroute Aircraft	G	TOP5 #3 Several items listed in SR. #2 Additional data provided by RA/TS developers. Item #4 needs to be reviewed by RWG. NEW Opened PRQ CSCnj15016 to cover this item.
CSCwb07792	ZAU	1209600000	Unable to exempt manually scheduled a/c from manual runway allocation	Q	TOP5 #4 Approved for intent; build TBD.
CSCwb08638	ZAU	1234483200	TMA ALL-Need to have the ability to model changes during TBM	G	TOP5 #5 Under Review by RWG.
CSCwb08116	ZAU	1219708800	TMA ORD Additional delay assigned to frozen and accepted departures	W	TOP5 #6 Two new cases are related to TMA Ground Speed Filter being used in ISM. One case the filter helps to smooth out the ground speed; but the other case it does not. More analysis done on the use of TMA Ground Speed Filter or some kind of enhancement in producing ground speed in TMA. Reassign SYS Eng CSCnj15014 opened to capture issue
CSCwb08522	ZAU	1231718400	Runway assignment needs to be displayable on DSR glass	G	TOP5 #7 Under Review by RWG.
CSCwb05272	ZBW	1132272000	show controller sector delay and overall system delay	P	TOP5 #1 This SR is currently in Postponed state. This SR is related to new functionality and would require changes to MMG; HADDS and Host/ERAM systems.

CSCwb05805	ZBW	1153440000	No file for Internal Departure Delays	W	TOP5 #3 Maps to RPR CSCwb02065
CSCwb07849	ZBW	1211414400	ZBW_EDC_Exempt JFK and HPN depts from WALL	G	TOP5 #4 Under review by RWG; since the ability to handle a large number of EDC destination airports needs to be addressed via implementation of the airport group concept.
CSCwb05574	ZBW	1144195200	Single Gate Free Flow	W	TOP5 #5 Approved for intent; maps to RPR 1374
CSCwb07574	ZDC	1205452800	ZDC: Request the ability to view the Meter List on the URET System.	I	TOP5 #3 Assigned to Program Office for investigation.
CSCwb08631	ZDC	1234310400	ZDC: IAD modify Schedule a Departure window	G	TOP5 #4 Under review by RWG.
CSCwb08530	ZDC	1231891200	ZDC: EDC departure call-back color request	G	TOP5 #5 Under review by RWG.
CSCwb06781	ZDV	1181606400	EDC Dynamically combine/decombine destination arpts to streams	Q	TOP5 #1 Approved for intent; build TBD
CSCwb06833	ZDV	1184112000	ZDV EDC - Labeling TGUI window title bar	Q	TOP5 #2 Approved for intent; build TBD
CSCwb07256	ZDV	1197504000	Visual way to identify MIT being applied on a collapsed stream	Q	TOP5 #3 Approved for intent; build TBD
CSCwb07059	ZDV	1191974400	ZDV EDC MIT Start and Stop time	Q	TOP5 #4 Approved for intent; build TBD
CSCwb05538	ZDV	1142467200	Schedule Stabilization Indicator	W	TOP5 #5 Approved for intent; maps to RPR CSCwb05698; Build TBD.
CSCwb07676	ZID	1207180800	ZID: MULTIPLE METER LIST	Q	TOP5 #2 Approved for intent; build TBD

CSCwb07569	ZID	1205366400	ZID: ICON LABELS	I	TOP5 #3 In 4.0; the sites won't have icons. The gnome taskbar will have buttons on it for each GUI that has the full name (as defined in the customization files). Maps to CTSrv02163; SW fix Rejected by site.
CSCwb07567	ZID	1205366400	ZID:EDC NEW STREAMS PANEL / RESTRICTIONS	Q	TOP5 #5 Approved for intent; build TBD
CSCwb06564	ZID	1176422400	ZID: Blocking Meter Fixes & Runways	Q	TOP5 #4 Approved for intent; build TBD
CSCwb06937	ZJX	1187827200	ZJX: EDC; Relief Briefing Display	Q	TOP5 #1 Approved for intent; build TBD
CSCwb08128	ZJX	1220313600	EDC departure release time truncating	G	TOP5 #2 Under review by RWG
CSCwb07042	ZJX	1191801600	ZJX: Change increments for MIT Spin Box from 1 mile to 5 miles	Q	TOP5 #3 Approved for intent; build TBD
CSCwb06935	ZJX	1187827200	ZJX_ EDC; Move Departure Airport Configuration Window	Q	TOP5 #4 Approved for intent; build TBD
CSCwb06934	ZJX	1187740800	ZJX_ EDC; Reduce Key Strokes	Q	TOP5 #5 Approved for intent; build TBD
CSCwb08616	ZKC	1233705600	ZKC EDC-Inaccurate Scheduling of Departures to ATL	I	TOP5 #1 Sys Eng reviewed the data for the three flights and found the ETA mismatches mentioned in the site report were not caused by wind data; nor by TMA’s STA or ETA calculations. For Flight LOF5540; will need to address the improper turn modeling and it is recommended that the STL RW 30 initial heading adapted value be reduced to

					3.5 nm.
CSCwb08730	ZKC	1237075200	ZKC-EDC. Unable to apply Future Change to individual airports and MP's	G	TOP5 #2 Under review by RWG
CSCwb07251	ZKC	1197417600	EDC ZKC system needs a configuration for abnormal; bad WX days	Q	TOP5 #3 Approved for intent; build TBD
CSCwb07181	ZKC	1195084800	EDC MP Future schedule changes should not be displayed at other MPs	Q	TOP5 #4 Approved for intent; build TBD
CSCwb07173	ZKC	1195084800	Automatically populate timeline footers with MITas set in F1 STREAMS	Q	TOP5 #5 Approved for intent; build TBD
CSCwb03288	ZLA	1052956800	ZLA: Request Sliding Freeze to Allow Removal of Unnecessary Delay	W	TOP5 #3 Maps to RPR CSCwb04775. This RPR was postponed by the RWG members at the annual meeting held December 7-8; 2005
CSCwb07637	ZLC	1206316800	ZLC: Change Request for the " Future Scheduling Changes" Parameter	Q	TOP5 #2 Approved for intent; build TBD
CSCwb07644	ZLC	1206489600	ZLC: Adaptable Color for Life Guard Flights [LN]	Q	TOP5 #3 Approved for intent; build TBD
CSCwb06034	ZLC	1161820800	ZLC: Right Click Does Not Identify Default Assigned Runway	W	TOP5 #4 DDTS record CSCwb06646 has been opened for this new requirement. Build TBD
CSCwb06470	ZMA	1173916800	Not enough Freeze Horizon settings.	Q	TOP5 #1 Approved for intent; build TBD
CSCwb06461	ZMA	1173830400	ZMA: Reschedule a block set of aircraft within a specific time period.	Q	TOP5 #3 Approved for intent; build TBD

CSCwb08218	ZMA	1222732800	TEXT BOX NOT WORKING FOR MULTIPLE AIRPORTS.	G	TOP5 #3 Shortcut function only uses the super stream definitions that are in effect. The site would like it to also change the super stream mappings; if necessary; based on the user entered text. Under RWG review.
CSCwb09874	ZMP	1288051200	See CSCwb09869	I	TOP5#1 Assigned to RWG. This SR is a dupe of SR CSCwb09869 (ZOB) and CSCwb06363 (ZAU).
CSCwb08072	ZNY	1218067200	Runway matrix settings revert back to default settings automatically.	G	TOP5 #1 Approved for intent; build TBD
CSCwb07958	ZNY	1214352000	Input of BDL radar to ZNY TMA system	G	TOP5 #2 Under review by RWG
CSCwb06443	ZNY	1173225600	Color coding of aircraft types on the PGUI	Q	TOP5 #3 Approved for intent; build TBD
CSCwb09104	ZOA	1247788800	STA Jumps at Meter Fix	G	TOP5 #1 CSC System Engineering recommends that this Site Report be forwarded to the TMA RWG due to the MFX deconfliction issues raised by potential solution options; detailed notes provided in DDTS attachment.
CSCwb09139	ZOA	1248393600	Fluctuating display of aircraft in AMOD list during holding	G	TOP5 #2 Originally CSC recommended rejection. SWG concurred and this SR was rejected. Site agrees this SR is working as designed; but does not concur with the rejection and has asked to have this SR reinstated. It has been moved back to I state and will go to the CSC-ENG for review. Also see SR CSCwb09104 and CSCwb07479.

CSCwb09138	ZOA	1248393600	Frozen Aircraft not displayed on DSR	W	TOP5 #3 Maps to RPR CSCwb04091; Build TBD
CSCwb08771	ZOA	1238457600	ZOA Requests ATOPS/ETMS data feed for TMA	I	TOP5 #4 Under investigation by the FAA. Once approved by the FAA; this SR will need to go to the RWG.
CSCwb09232	ZOA	1250035200	Stream Class Apply button	G	TOP5 #5 Under review by RWG
CSCwb09869	ZOB	1287532800	Allow Speed Crossing Restrictions to be changed dynamically.	G	TOP5 #1 New enhancement. Same issue as CSCwb06363 (ZAU) and CSCwb09874 (ZMP)
AOSin01143	ZOB	1320019200	ZOB_TMA: ZNY PHL arrival showed two different meter list times for PHL/MBL; and PHL/JST MLAS arcs.	R	TOP5 #1c Approved for a PR to be fixed in the TBFM 4.01 National Release.
CSCwb09835	ZOB	1279497600	DCT jumps for 4 mins and does not match difference between ETA and STA.	W	TOP5 #2 Review of data found times sent to HOST are correct. However; there is was an unexplained jump in the ETA time to the display point at the two times listed. RA/TS developers reviewed and found this SR maps to CSCnj15011.
CSCwb08555	ZOB	1232409600	ROC departure got +06 delay (MES3517)	G	TOP5 #3
CSCwb09145	ZOB	1248652800	Re-route not processed for FLG2404	G	TOP5 #4 Discussion enclosure updated with latest notes. Needs to go to system engineering for review of the possible approaches provided by the software developer.
CSCwb08488	ZOB	1230076800	What if? Planning.	G	TOP5 #5a Under review by RWG
CSCwb07410	ZOB	1201824000	Future Change indicator appears on time lines not applicable	Q	TOP5 #5c

CSCwb06126	ZOB	1164672000	Acquiring a list of A/C by selecting a time interval on the bar graph on	W	TOP5 #5d
CSCwb05902	ZSE	1157673600	ZSE Reschedule Requirement in TMA	W	TOP5 #1 Approved for intent; Build TBD.
CSCwb06270	ZSE	1168905600	QXE121 OTP in HOST showed VFR on PGUI	W	TOP5 #7 Maps to CSCnj11966 (Adapt) & CSCwb04696 (RPR)
CSCwb01006	ZTL	974764800	ZTL Spiral 2: Placement of Future Configuration Change flag on timelines	W	TOP5 #1a
CSCwb08453	ZTL	1229040000	ZTL_ATL: Additional Scheduling Capability	I	TOP5 #5 Under investigation by FAA program office.